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Australia.

DEPT. OF MINES

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Engineering

A REVIEW

OF

MINING OPERATIONS

IN THE

STATE OF SOUTH AUSTRALIA

DURING THE

HALF-YEAR ENDED JUNE 30th, 1916.



DO NOT REMOVE
No. 24.
FROM THIS ROOM

Compiled by LIONEL C. E. GEE, S.M., Chief Registrar and Recorder, Department of Mines,

ISSUED UNDER THE AUTHORITY OF THE

HONORABLE R. P. BLUNDELL, M.P.,

Minister of Mines,

By F. C. WARD, J.P., *Secretary for Mines.*

DEPARTMENT OF GEOLOGICAL SCIENCES,
UNIVERSITY OF TORONTO
Adelaide:

R. E. E. ROGERS, GOVERNMENT PRINTER, NORTH TERRACE.

1916.

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Miners' Rights and Privileges thereunder.

A miner's right is obtainable at the Department of Mines, Adelaide, also at the issuing stations in the various mining districts, at a cost of 5s.; it is in force for one year from the date of issue, and may be renewed at any time during its currency for another term of one year on payment of 5s. The holder is authorised to prospect on any mineral lands for any metal, mineral, coal, or oil, and to peg out (of the prescribed shape and dimensions) gold, mineral, coal, and oil claims, and also leases of a like nature.

AREAS AND WORKING CONDITIONS.

GOLD LEASES—Maximum area, 20 acres; working conditions, one man to every five acres.

MINERAL LEASES—40 acres; one man to every 10 acres.

MISCELLANEOUS LEASES—

Salt 640 acres; special conditions.

Gypsum 640 “ “

Mining Works..... 10 “ one man.

COAL OR OIL LEASES 640 “ one man to every 40 acres.

GOLD DREDGING LEASES 200 “ special conditions.

MINERAL CLAIMS 40 “

GOLD CLAIMS..... 30ft. x 30ft., alluvial; 100ft. x 600ft., reef.

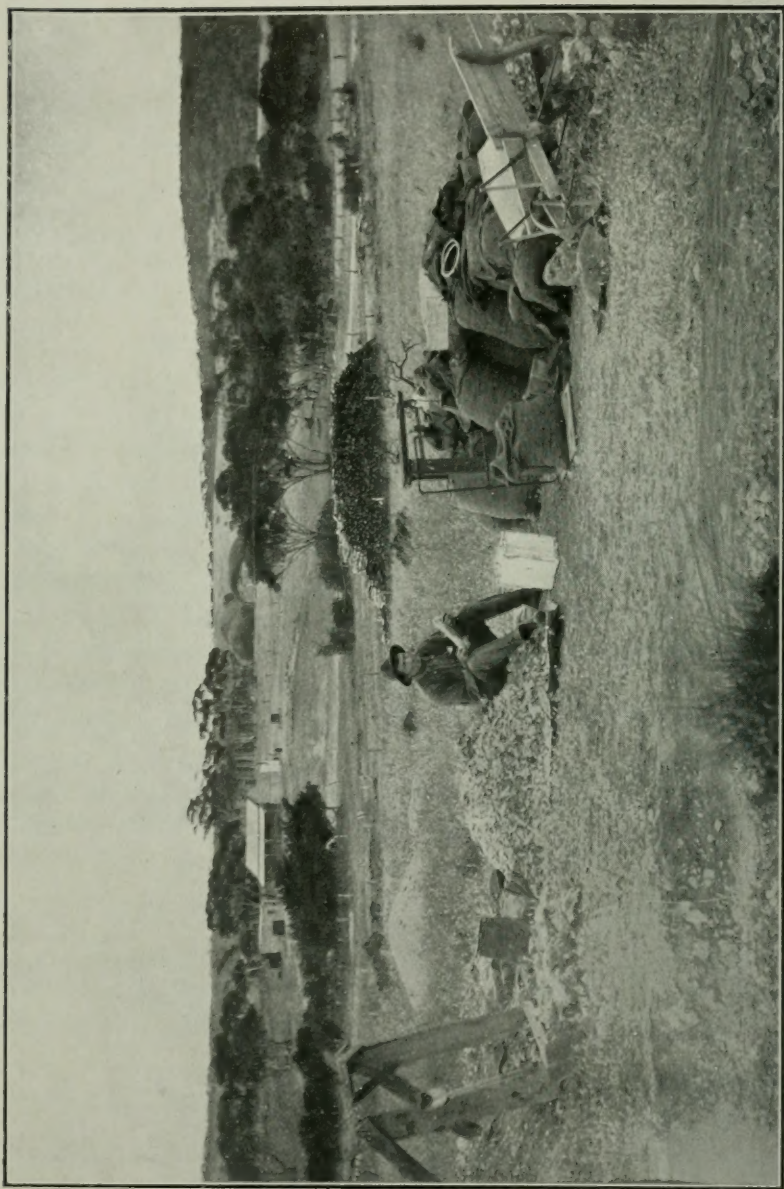
Gold claims must be constantly worked—one man for each claim—and mineral claimholders must employ two men for each claim. Amalgamation of either gold or mineral claims reduces the labor conditions by one-half until payable results have been obtained.

Gold, mineral, coal, and oil leases are granted for a term not exceeding 42 years—the two former at a rental of 1s. per acre per annum and a royalty of 6d. in the pound on net profits, the latter at a rental of 6d. per acre per annum until coal or oil is found in payable quantities, when 1s. per acre is payable and a royalty of 6d. in the pound on the net profits.

The Minister may permit, for the concentration of labor, of the amalgamation of not more than four adjoining gold or mineral leases.

Any number of gold, mineral, coal, or oil leases may be held by one person.

Licences to search for twelve months for precious stones, mineral phosphates, oil, rare metals, minerals, and earths are issued on specific mineral lands, not exceeding five square miles in area for one person, a fee of 20s. being charged for each square mile or portion thereof. These licences give a preferential right to a lease over a portion of the area, as prescribed.



Asbestos Mine, Hundred of Bright.

PREFACE.

THE average price of standard copper for the six months is £111 14s. 7d., and for electrolytic £135 8s. 4d.

It is understood that the bulk of the South Australian copper was purchased by the Imperial Government at a contract price of £100 per ton. To find figures approximating these we have to go back about 60 years, when records show that the average price of standard copper for the years 1851-60 was £107.

The search for copper has been stimulated, but not as much as might have been expected.

Good individual gold returns have been obtained at Tarcoola and Mount Torrens, and efforts are again being made to revive mining in the Hills district.

The salt-scraping season was a very fair one; interest in the non-metallic minerals continues, and, as an instance, good samples of Epsom salts and Glauber salts manufactured from local raw material have been produced.

The issue of this number for distribution to the public has not, fortunately, been delayed by the paper supply difficulty, as was the case with No. 23.

LIONEL C. E. GEE,

Chief Registrar of Mines.

August 24th, 1916.

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Mining Operations during the Half-year ended June 30th, 1916.

AREA AT PRESENT HELD UNDER MINING ACTS (JUNE 30TH, 1916).

Nature of Holding.	Number.	Area.
Mineral leases	307	13,880 acres
Gold leases	86	1,560 "
Miscellaneous leases	57	14,905 "
Coal and oil leases.....	4	1,360 "
Mineral claims	370	14,583 "
Occupation licences	208	104 "
Search licences	319	811,520 "
Coal and oil claims	6	3,840 "
Gold claims	3	10 "
Total holdings	1,360	861,763 acres

REGISTERED FROM JANUARY 1ST, 1916, TO JUNE 30TH, 1916.

Mineral leases	15	600 acres
Gold leases	4	64 "
Mineral claims	122	4,432 "
Coal and oil claims	1	640 "
Occupation licences	17	8 "
Search licences	119	285,440 "
Miners' rights	512	—
Total	790	291,184 acres

MEN EMPLOYED.

Estimated number of men employed in mining and mineral works, June 30th, 1916 :—

Copper	2,000
Gold	200
Salt	375
Silver-lead	25
Other minerals.....	300
Smelting works, Port Pirie.....	1,100
Raising flux, etc., in connection therewith	400
Total.....	4,400

Prince Albert, hundred Onkaparinga (copper).

Thunder Queen 59

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The average price per ton of standard copper for the six months is £111 14s. 7d., and for electrolytic £135 8s. 4d.—the range of prices being—

Standard.

	£	s.	d.
Highest, May 18th	145	5	0
Lowest, January 14th	85	0	0

Electrolytic.

Highest, May 18th	158	0	0
Lowest, January 5th	109	10	0

This is the highest price for standard copper since the years 1851–60 ; the average for that period being £107, for the years 1801–10 £154 8s., and 1811–20 £125 9s.

At the *Walleroo and Moonta Mines* 107,790 tons of vein stuff have been broken and 99,634 tons, carrying from 2·9 per cent. to 2·3 per cent. copper, treated. Mining work is in progress on various lodes, vein stuff hauled to surface, crushed, sorted, and concentrated by special machinery or treated chemically, the products forwarded to Wallaroo for smelting and refining into copper. The retreatment works are also in full operation.

The *Hamley Mining Company* has sold its holdings to the Wallaroo and Moonta Company. The old company has been enabled to repay the amount of £2,100 advanced by the Government for its assistance and vigorous operations have been put in hand by the new proprietors, there being about 120 men employed at present.

The *Hamley (or Karkarilla) Mine* was first started in 1861 ; high-grade ores have been obtained from time to time, and it is stated that about £59,000 was paid in dividends. Details concerning the mine will be found at page 61, Record of Mines.

The general manager of the *Pernatty Mines* reported on March 30th that his investigations had failed to confirm the optimistic reports previously furnished on the property ; that the bore holes and pits put down by him had only given very disappointing results, and, briefly, that he was unable to find sufficient ore to keep even a small experimental plant running.

Operations were discontinued, and the company has now gone into liquidation. It is understood, however, that an effort is being made to give the place another trial.

Yudnamutana Mine (Flinders Company).—The water shaft in the Daly has been sunk to 100ft. 6in., a crosscut put in 105ft., and a water supply of 600galls. per hour obtained. Small parcels of 62·7 per cent. copper precipitates and 22 per cent. copper ore have been marketed.

The celebrated old *Burra Burra Mine* has been purchased by Mr. A. J. McBride, and experimental metallurgical work is now being carried on there by Mr. Du Faur in connection with the accumulated tailings on the property.

A little tributing is in progress on the *Kapunda Mine*, and about 13½ tons of 22 per cent. ore marketed.

In connection with these old mines, and the strong feeling existing among mining men that these and many others are well worth restarting, the following cutting of August 24th, 1854, supplied by the Under Treasurer (Mr. Thomas Gill) will be of interest:—

OUR COPPER AND LEAD MINES.

(*Register*, August 24th, 1854.)

“We have been favored by Captain Pascoe with the following approximate return of copper and lead ores raised in South Australia since the first discovery of our metalliferous deposits:

Mines (Copper).	Produce in Tons.
Burra Burra	92,284
Karkulta	75
Kanmantoo	3,441
“ (leased portions)	560
Paringa	512
“ (leased portions)	300
Montacute	2,000
Adelaide	500
Enterprise	200
Reedy Creek	1,200
South Kapunda	200
Kapunda	12,650
North Rhine	100
Princess Royal	588
Port Lincoln	550
Royal Mining Company	60
Dutton's Mine	50
Strathalbyn }	250
Breadalbyn }	
Glenalbyn }	

115,520

Mines (Silver-lead).	Produce in Tons.
Glen Osmond	1,009
Wheal Watkins	1,000
Wheal Gawler	90
Wheal Grainger	70
Wheal Margaret	120
Wheal Brothers	40
Belvidere	100
	<hr/> 2,429

“ The value of 115,520 tons of copper ore, at £15 per ton, would be £1,732,800 ; and of 2,429 tons of silver-lead ore, at £12 per ton, £29,148, making, together, a revenue of £1,761,948 already derived from the mines of the colony. The bulk of these ores was produced between the years 1844 and 1850. We are assured that, reckoning every person employed (including men, women, and children) in raising and preparing the ores, the mining population of the colony, even before the gold-fields were discovered, never exceeded 3,000 souls ; so that the aggregate return of their productive industry in those years averaged nearly £600 per head. It should be borne in mind that nothing approaching to a state of exhaustion has resulted from such extensive productiveness. The Burra Burra, which has yielded so large a proportion of the aggregate above mentioned, is still rich in the quality of its ores, in its manifestly great productive capabilities, and in the productive wealth which is more than likely to confirm the most flattering predictions of practical and scientific men. The Kapunda's ores have averaged fully 21 per cent., and at this rate the produce of the mine must have amounted to the large sum of £227,700. Even in 1848 as many as eight lodes had been discovered, and were all producing ores of good quality ; and as the mine is technically and, no doubt, truly described as ‘ only just coming into a good course of working,’ it is difficult to form an estimate of its value or the extent of its future productiveness.

“ Several of the mines referred to above have given earnest of future metalliferous wealth rather than of absolute and profitable yield, which claims especial descriptive record ; but in many instances this earnest has been quite sufficient to satisfy the sagacious and experienced mind, and to form strong grounds of favorable calculation for the future, when, perhaps, the mineral products of South Australia will be rich, various, and vast, beyond the most sanguine anticipations of the present day.”

From Briscoe's Claims, near *Boorthanna Siding* on the Great Northern railway, 23½ tons of ore returned 553·68 units of copper.

Some prospecting for copper is in progress near *Coondambo*.

The work done at the *West Burra*, situated about 3½ miles S.W. of the Burra Mine, consists of winze sinking, driving, and cross-cutting, and a small parcel of ore has been dressed up to 30·59 per cent.

At *Mount Gunson* 452 tons of ore have been raised, but not treated.

Copper mining in a small way is in progress --

<i>North.</i>	<i>North-East.</i>	<i>North-West.</i>
Bluman	Marjorie	Sweet Nell
Nichols' Nob	Cutana	Monalena
Diamond Jubilee	Nildottie	
Belliack	Mount Moore	
Mount Burr	Penn	
Warra Warra		
And various prospect- ing shows		

A company has, with the approval of the Federal Treasurer, been formed to rework the well-known old *Spring Creek Mine*, near Wilmington, and preliminary operations have been started. In the past high-grade ore, containing cuprite and native copper, was obtained above water level, and smelters were erected near the Melrose and Beautiful Valley road in the vicinity. It is proposed to work the mine on an extensive scale and erect suitable pumping machinery.

A little prospecting from the old workings of the *Wheal Watkins*, one of the Glen Osmond group of silver-lead mines, has been done by the Tarcoola Development Syndicate.

Martin Glynn's Claim. - A new find of gold-bearing stone has been made near the S.W. border of the Wadnaminga Gold Field (as originally proclaimed) and about 20 miles in a southerly direction from Mannahill. A report on the claim will be found at page 60, and, apart from its special possibilities, the find is interesting as enlarging the area over which gold is known to exist.

The *Haklo Mine* is a comparatively new discovery on an area known as Hynes' Section, near Blumberg, and from which a considerable quantity of alluvial gold has been obtained in the past.

It has been opened out to a depth of about 100ft. on a lode dipping about 30° to the northward and for a length of 50ft. to 60ft. The lode exposed is continuous within these limits and has a width of from 3in. to a foot, and consists of quartz, limonite after pyrite, and more or less limonite impregnated mica schist; pyrite is also present. It is enclosed in soft material derived from the decomposition of micaceous schist and slate, and its limits, both vertically and horizontally, do not appear to have been reached.

A total of 132 tons 17cwt. has been treated at the Mount Torrens Government battery for a yield of £338 10s. 10d., or 50s. per ton.

A considerable proportion of the lode proved has yet to be stoped. Five or six feet below the lode from which these results have been obtained a second body of stone, about a foot in thickness, has just been exposed, similar in appearance to the first worked body.



Asbestos Workings.

Summary of operations at the *Deloraine Gold Mine* for the six months furnished by the manager—

The S. drive at the 192ft. level has been extended 42ft., making a total length of 334ft. The stopes at this level have been opened out S. of the main shaft for a distance of 280ft., and the necessary ore shoots placed in position.

The reef worked at this level has averaged 48in. in width for a value of 57s. per ton.

At the 292ft. level the drive S. has advanced from 170ft. to 220ft. At a distance of 206ft. from the shaft a rise has been put up 108ft. and a connection made with the 192ft. level. This rise has proved payable stone the whole distance, varying from 20in. to 66in. in width with values fluctuating from 30s. to 85s. per ton.

Surface.—An additional Cornish boiler (40h.p.) has been built in position on the mine, and the buildings covering the engines and boilers have been dismantled and considerably enlarged.

During the six months 2,244 tons of stone were treated for 1,284ozs gold bullion, valued at £5,231 ; and 1·9 tons copper, worth £201 9s. 9d.

Tarcoola Blocks returns show—

Leases 1002/4 and 1560.—Prospecting by means of longitudinal and transverse costeens and trenches on and along lines of lode, sinking, and tunnelling. Sixty tons of ore raised ; 6 tons treated at the Government Battery and Cyanide Works, Tarcoola, for 56ozs. 15dwts. 2grs. gold bullion, valued at £175 19s. 5d., or 586s. per ton.

Leases 1005, 1013/5, and 1020.—Driving and tunnelling along lines of lode to test the ground for possible payable shoots of stone. General prospecting and pumping to keep mine workings free from water.

The manager *Lux and Queen Bee Gold and Copper Mine* reports—“ No crushing done during the period owing to the complete failure of the water supply. The ore raised was largely chalcocite, 23 tons of which were sent to Port Kembla Smelting Works for treatment in order to secure payment for the gold contents, the result being 8ozs. 1dwt. gold and 2·63 tons copper. The balance of the ore raised has been stacked pending completion of arrangements now being made to secure a permanent water supply. The lodes continue of the same size and values, and with the complete plant now on the ground regular payable returns of gold and copper seem assured when water is available.”

Kirkeek's Treasure.—Very little work has been done on the mine on account of not being able to get skilled miners, but a large amount of surface stripping has been carried out along the cap of the lode, and the low battery return, viz., 220 tons for 32ozs. 7dwts. 3grs., valued at £109, is from this dirt, which was treated to ascertain its gold-bearing values.

Medora and Mount Grainger.—The mine is let to tributers, who have been doing general work, but have not had a crushing.

From the *Homeward Bound* 13½ tons yielded 12ozs. 9dwts. 3grs. gold bullion of high quality, being valued at £48 6s. 3d.

Sinking and stoping at various points of the lode are in progress.

The unwatering of the *Eureka Mine*, near Woodside, is in progress ; a preliminary, it is hoped, of a reawakening of mining interest in this district.

Up to date the Government plant at Mount Torrens has, at different times, treated a total of 519½ tons of Eureka stone for 319ozs. 16dwts. 7grs. of gold bullion, valued at £1,111 1s. 4d., or 42s. per ton. In 1897 Messrs. McArthur & Co. cyanided 2,894 tons of old tailings for 583ozs. 5dwts. 21grs. fine gold.

Further details will be found at page 327, Record of Mines.

One hundred and nineteen search licences for oil have been issued during the six months. Boring continues in the South-East ; the bore of *The South Australian Oil Wells Co.* has reached a depth of over 3,000ft., and a new company (*The Amalgamated Oil-Boring Company, Ltd.*) has commenced operations in the hundred of Murrabinna.

The health of Mr. W. H. Matthews (Chief Inspector of Mines and Warden) had not been good for some time, and, acting on medical advice, he, early in the year, intimated to the Government his intention of retiring from the service. Prior to entering the Government service, 16 years ago, Mr. Matthews had a long and interesting career as a mine manager throughout Australia, and had the distinction of being the manager of perhaps the richest find in Australia (Bayley's Reward, W.A.) at the zenith of its fame. Mr. Matthews' varied experience, his equable temperament, and his tactful disposition gained him the confidence of the public, and although his retirement was a regretted matter of necessity it is a pleasure for his former associates to know that, freed from the cares of office, his health has much improved.

Upon this retirement the organisation of the Department of Mines was modified. The Government Geologist was appointed Director of Mines and Supervisor of Boring Operations, being thus charged with the general supervision of all the technical operations of the department.

Mr. Louis Joseph Winton, B.E., was appointed to the office of Chief Inspector of Mines in succession to Mr. W. H. Matthews. Mr. Winton passed through the engineering school of the University of Sydney, graduating in 1901, and has since had a considerable experience of mining and metallurgical work in connection with gold, silver, lead, and copper mines, chiefly in the Broken Hill and Cobar fields, having been placed in complete control of mines in different stages of development.

He holds a first class mine manager's certificate of competency, and has been manager of the C.S.A. mine, the Cobar Gold Mine, the Chesney Mine, and the North Cobar Mine. As a metallurgist he held the position of assistant metallurgist to the Great Cobar Copper Company, having, for a period, complete charge of all smelting operations.

The extensive sampling and estimation of tonnage and values in the Cobar Gold Mine were carried out under his direction prior to the sale of this mine to the Great Cobar Company, and the accuracy of his estimates was subsequently borne out by results.

Mr. Winton assumed the duties of his office at the end of May.

The Government Metallurgist, Mr. J. D. Connor, B.Sc. (*vide* Review No. 22, pages 6 and 7), on his return from America completed in March a valuable detail report on his observations and investigations, which, owing to the difficulties in the paper market, has only been issued and distributed in pamphlet form recently.

A small experimental plant has been erected on the Frome Road for the purpose of carrying out tests on copper-bearing and other ores. This plant is not designed on a scale that will permit of the treatment of parcels of ore, but it comprises the means of carrying out the tests that should be made before the erection of a treatment plant is undertaken. Provision has been made for testing not only oxidised copper ores to which leaching methods are applicable, but also for testing the amenability of complex ores to wet gravity concentration methods.

The crushing appliances comprise a small jaw breaker and rolls, made by Messrs. May Bros., of Gawler, as well as a Braun pulverizer.

The motive power is electricity, and a British Thomson-Houston D.C. motor has been installed.

A muffle furnace has been erected to carry out any roasting experiments that may be deemed necessary.

The apparatus for conducting experiments in wet concentration is a miniature testing set by the General Engineering Co., of Salt Lake City. This set consists of a Hartz jig, a Wilfley table, a galvanised iron Spitzkasten of three divisions, and an upward current classifier. A small automatic feeder is provided for the table and jig.

From the results of a test of a sample parcel of ore with this apparatus it will be possible to state what proportion of concentrates would be recoverable by the use of similar apparatus on a working scale. The concentrates from the experimental plant can be weighed and assayed, and the advisability of erecting machinery for wet concentration can be decided upon.

This testing set is probably the only one of its kind in Australia, and it promises to be of great service for preliminary work. The plant is now available for use, and the Government Metallurgist is prepared to carry out tests on ores that may prove suitable. It is hoped that full advantage will be taken of the opportunities offered. In other countries it is considered good practice to have preliminary investigations made in some detail before working plants are erected; and the Government of South Australia, in providing the means for carrying out the tests under the supervision of a trained metallurgist, believes that the mining industry will be greatly benefited.

DEPARTMENT OF MINES.

"THE NATIVE INDUSTRIES ENCOURAGEMENT ACT, 1872."

NOTICE OF THE OFFER OF A BONUS FOR THE DISCOVERY OF OIL

Adelaide, July 26th, 1915.

A bonus of £5,000 is offered to the person or body corporate which first obtains from a bore or well situated in the State of South Australia 100,000galls. of crude petroleum, containing not less than 90 per cent. of products obtainable by distillation.

No application for a bonus will be considered unless the following conditions have been strictly complied with :—

1. The applicant for the bonus must have furnished to the Minister of Mines, during the progress of drilling operations—

- (a) A monthly record of work done ;
- (b) A full log of all bores and wells sunk, whether successful or unsuccessful ;
- (c) Samples of materials passed through by the bores, to be taken at every 50ft. sunk, and also at every change of country encountered ;
- (d) A declaration pursuant to " The Statutory Declarations Act, 1835," of the exact locality of each bore or well. (This should be furnished with the first monthly report on the bore or well).

2. The oil must have been stored at the bore or well from which it has been obtained until the whole 100,000galls. has accumulated.

3. The applicant must furnish with his application—

- (a) The certificate of a licensed surveyor nominated by the Minister of Mines as to the quantity of oil so stored ;
- (b) The certificate of the Government Analyst of the result of his analysis of samples of the oil taken by a person nominated by the Minister of Mines ;
- (c) A declaration pursuant to " The Statutory Declarations Act, 1835," that the whole of the oil for which the bonus is claimed was obtained from the bore or well where it is stored.

4. Within 24 hours of the first discovery of oil in the well or bore, notice of such discovery must be sent to the Minister of Mines.

5. Any person who desires at any time to inspect or test the well or bore on behalf of the Minister of Mines must be granted every facility for this purpose.

6. The applicant must have done nothing contrary to the provisions of " The Mining Act, 1893," or " The Mining Act Amendment Act, 1900," or of any lease or licence granted to the applicant under either of these Acts.

R. BLUNDELL, Minister of Mines.

CRUSHING AND CYANIDING PLANTS.

RETURNS FROM GOVERNMENT CRUSHING AND CYANIDING PLANTS FOR THE HALF-YEAR ENDED JUNE 30TH, 1916.

Name of Mine.	Locality.	Weight of Ore.	Gold Bullion Recovered.	Total Value of Bullion.	Yield per Ton, in Shillings.
		Tons cwt. qrs.	Ozs. dwts. grs.	£ s. d.	s.
MOUNT TORRENS BATTERY AND CYANIDE WORKS.					
Haklo (Dan O'Connell)	Blumberg	21 0 0	18 10 22	73 7 8	69
Eureka	Woodside	11 0 0	9 16 6	31 18 4	58
"	"	5 0 0	1 15 5	5 7 10	21
* "	"	6 14 0	5 6 6	16 13 1	49
Haklo	Blumberg	25 0 0	15 15 20	62 9 3	49
Eureka	Woodside	4 17 0	0 10 22	1 14 4	7
Haklo	"	16 14 0	11 6 8	45 10 0	54
"	"	16 7 0	15 12 12	60 13 8	72
Total		106 12 0	78 14 5	297 14 2	55
Grand total since starting of battery ..		10,792 16 3	6,239 3 18	23,582 19 2	43

* Also concentrates recovered, 4cwt., assaying 4oz. 4dwt. gold, 6oz. silver per ton, and 9 6 per cent. copper.

Total ore treated to date at State batteries from above mines—

Haklo	Blumberg	132 17 0	86 10 3	338 10 10	50
Eureka	Woodside	519 10 3	319 16 7	1,111 1 4	42

TARCOOLA BATTERY AND CYANIDE WORKS.

Gallipoli	Tarcoola	31 15 0	22 16 8	74 5 0	45
Tarcoola Blocks	"	5 0 0	56 15 2	175 19 5	586
Royal George	3 miles W. of Tarcoola	37 0 0	27 14 17	101 13 11	55
Tarcoola Perseverance	Tarcoola	51 0 0	96 1 14	361 15 9	141
Curdnatta	"	26 0 0	25 11 6	93 8 2	72
Royal George	3 miles W. of Tarcoola	10 0 0	5 19 22	22 4 11	44
Curdnatta	Tarcoola	10 10 0	4 16 23	17 5 9	33
Tarcoola Perseverance	"	50 5 0	75 6 20	282 14 0	112
Morning Star	"	18 5 0	17 5 20	56 6 2	61
Shamrock	"	10 10 0	10 8 22	38 3 0	72
Gallipoli	"	31 10 0	16 0 13	52 13 9	33
Royal George	3 miles W. of Tarcoola	25 5 0	14 6 15	52 5 1	41
Tarcoola Perseverance	Tarcoola	51 5 0	71 18 15	257 15 11	100
Wondergraph	"	10 0 0	27 4 4	97 18 1	195
Shamrock	"	18 0 0	47 18 19	191 18 3	213
Total		387 5 0	520 6 4	1,876 7 2	96
Grand total since starting of battery ..		7,151 10 0	10,062 12 6	35,557 15 2	92

RETURNS FROM GOVERNMENT CRUSHING AND CYANIDING PLANTS—*continued*.

Name of Mine.	Locality.	Weight of Ore.	Gold Bullion Recovered.	Total Value of Bullion.	Yield per Ton, in Shillings.
		Tons cwt. qrs.	Ozs. dwts. grs.	£ s. d.	s.
TARCOOLA BATTERY AND CYANIDE WORKS—<i>continued</i>.					
Total ore treated to date at State batteries from above mines—					
Gallipoli	Tarcoola	104 10 0	183 15 11	628 15 8	120
Tarcoola Blocks	"	290 15 0	579 19 0	1,650 19 0	113
Tarcoola, Enterprise	"	301 15 2	462 3 15	1,595 14 7	105
Lease					
Tarcoola, Warrigal	"	118 17 0	134 16 4	347 18 5	58
Lease					
Royal George	"	657 15 0	447 14 0	1,650 16 10	50
Tarcoola Perseverance	"	1,579 0 0	2,905 4 11	10,917 18 0	138
Curdnatta	"	734 6 0	947 11 1	3,394 19 4	92
Morning Star	"	283 15 0	543 6 13	1,838 16 4	129
Shamrock	"	28 10 0	58 7 17	230 1 3	161
Wondergraph	"	10 0 0	27 4 4	97 18 1	195

PETERSBURG BATTERY AND CYANIDE WORKS.

Myrtle (Dustholes) ..	Oodla Wirra	18 10 0	4 10 23	16 9 0	17
" ..	"	26 10 0	2 13 17	8 8 6	6
" ..	"	7 10 0	1 17 0	6 1 4	16
Wade	Dawson	3 5 0	0 9 6	1 11 6	9
Homeward Bound ..	Mannahill	3 0 0	3 5 3	12 5 1	81
" ..	"	10 5 0	9 4 0	36 1 2	70
Total		69 0 0	22 0 1	80 16 7	23
Grand total since starting of battery ..		5,121 6 0	4,587 18 5	17,029 12 4	66

Total ore treated to date at State batteries from above mines—

Myrtle	Oodla Wirra	282 7 1	109 6 23	387 14 5	27
Wade	Dawson	3 5 0	0 9 6	1 11 6	9
Homeward Bound ..	Mannahill	572 0 0	943 1 7	3,711 12 5	129

GLENLOTH BATTERY AND CYANIDE WORKS.

Sands and slimes only treated, approximately 275 tons.

Grand total since starting of battery ..	3,272 19 0	2,484 1 1	8,341 14 1	51
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RETURNS FROM CRUSHING AND CYANIDING PLANTS (OTHER THAN GOVERNMENT) FOR THE HALF-YEAR ENDED JUNE 30TH, 1916.

Name.	Ore Treated.	Gold Bullion Recovered.	Value.	Yield per Ton, in Shillings.
	Tons cwt. qrs.	Ozs. dwts. grs.	£ s. d.	s.
DELORAINÉ GOLD MINE.				
Delorainé	2,244 0 0	1,284 0 6	5,231 0 4	—
*Total	2,244 0 0	1,284 0 0	5,231 0 4	46½

* Also 1·9 tons copper, worth £2½ 9s. 9d.

RETURNS FROM CRUSHING AND CYANIDING PLANTS, ETC.—*continued.*

Name.	Ore Treated.			Gold Bullion Recovered.			Value.			Yield per Ton, in Shillings.
	Tons	cwts.	qrs.	Ozs.	dwt.	grs.	£	s.	d.	s.
WADNAMINGA (ALLANSON & CRITCHLEY).										
Thunder Queen	440	0	0	334	11	0	719	15	7	32 $\frac{3}{4}$
Milo dump	294	0	0	70	0	0	124	5	10	8 $\frac{1}{2}$
Total	734	0	0	404	11	0	844	1	5	23

KIRKEEK'S TREASURE, NILLINGHOO.

Kirkeek's Treasure (surface dirt mixed with rock)	220	0	0	32	7	3	109	0	2	—
Total	220	0	0	32	7	3	109	0	2	10

KITTICOOA, REEDY CREEK.

Battery treatment	165	0	0	35	15	0	115	7	0	—
Total	165	0	0	35	15	0	115	7	0	14 $\frac{1}{2}$

TOTAL BATTERY AND CYANIDE RETURNS FROM ALL PLANTS FOR SIX MONTHS ENDED JUNE 30TH, 1916.

Name.	Ore Treated.			Gold Bullion Recovered.			Value.			Yield per Ton, in Shillings.
	Tons.	cwts.	qrs.	Ozs.	dwt.	grs.	£	s.	d.	s.
Mount Torrens	106	12	0	78	14	5	297	14	2	55
Tarcoola	387	5	0	520	6	4	1,876	7	2	96
Petersburg	69	0	0	22	0	1	80	16	7	23
* Deloraine	2,244	0	0	1,284	0	0	5,231	0	4	46 $\frac{1}{2}$
Wadnaminga	734	0	0	404	11	0	844	1	5	23
† Kirkeek's Treasure	220	0	0	32	7	3	109	0	2	10
Kitticoola	165	0	0	35	15	0	115	7	0	14 $\frac{1}{2}$
Total	3,925	17	0	2,377	13	13	8,554	6	10	43 $\frac{1}{2}$

* Also 1·9 tons copper.

† Surface dirt and rock.

COPPER.

AVERAGE MONTHLY PRICE OF COPPER, JANUARY TO JUNE, 1916.

	Standard.				Electrolytic.		
	£	s.	d.		£	s.	d.
January	88	2	11	..	116	3	10
February	102	13	1	..	133	5	9
March	106	19	11	..	136	0	0
April ..	124	4	0	..	137	10	7
May	135	9	11	..	152	0	10
June	112	17	9	..	137	9	1
Average for the six months.....	£111	14	7	..	£135	8	4

RANGE OF PRICES.

STANDARD COPPER.

Highest—May 18th	£145	5	0
Lowest—January 14th	£85	0	0

ELECTROLYTIC COPPER.

Highest—May 18th	£158	0	0
Lowest—January 5th	£109	10	0

AVERAGE PRICE OF STANDARD COPPER FOR THE LAST TEN YEARS.

	£	s.	d.		£	s.	d.
1906	87	8	10	1911	56	1	10
1907	82	1	11	1912	73	1	3
1908	60	0	10	1913	68	5	8
1909	58	17	2	1914	60	8	1*
1910	57	3	3	1915	72	12	9

Average for the 10 years, £67 12s. 2d.

* Quotations for nine months only.

North-Western Mineral Deposits.



Earea Dam Tin Mine.—Showing Workings in the Bed of a Dry Lake.



Lake Labyrinth Gold Mine.

GOVERNMENT DIAMOND DRILLING OPERATIONS.

Report by the Supervisor of Boring Operations.

During the half-year ended June 30th, 1916, the two diamond drilling plants were kept continuously at work in the search for metalliferous lodes in mineralised areas.

One drill, in charge of Mr. A. W. Matthews, was at work in the Wallaroo district, where a series of holes is being drilled along the eastern boundary of the Wallaroo Extended leases in the endeavor to pick up any possible westerly extension of the Wallaroo main lode. These holes are inclined at a low angle in order to secure the maximum information for the footage bored. These bores have intersected a number of siliceous veins, some of which are mineralised, and a few patches of country rock impregnated with pyrite and chalcopyrite, but no formation giving any promise of profitable results on exploitation has yet been located. It is expected that the series of holes will soon be completed.

The other plant, in charge of Mr. C. F. Duffield, was during the early part of the half-year engaged in boring at the Mitalie Mine, 12 miles N.W. of Cowell. These holes were not fruitful of results and the drill was moved to the Yalpoondie Mine, about four miles to the southward, where a strong copper-bearing lode has been exposed for a considerable length by shallow workings. An inclined hole was bored to a depth of 401ft. at this place, but the results were disappointing.

The drill was then moved to Waukaringa to continue the work of searching for the downward extension of the shoot of ore formerly worked in the Alma Mine. An area has been reserved from the operations of the Mining Act for this purpose.

In this Review are published plans and diagrams of the boreholes recently drilled on Eyre's Peninsula at the *Calcookra*, *Mitalie*, and *Yalpoondie Mines*. Similar details with regard to the *Wallaroo Extended* bores will be published at a later date.

THE WALLAROO EXTENDED MINE.

No. 4 Bore (*vide* Review No. 23, pages 17 and 18) has been drilled from 1,005ft. to 1,083ft. The plant was then moved to No. 5 Bore (800ft.) and then to No. 6 Bore where a depth of 200ft. was reached by the end of the half-year.

No. 4 BORE.

1,005ft. to 1,008ft.—Mica schist.

1,008ft. to 1,014ft.—Quartzite.

1,014ft. to 1,026ft.—Quartzite with lenticles of mica.

1,026ft. to 1,030ft.—Mica schist.

1,030ft. to 1,040ft.—Mica schist with disseminated chalcopyrite and pyrite.

1,040ft. to 1,048ft.—Brecciated mica schist with sporadic pyrite and quartz vein at 1,041ft.

1,048ft. to 1,070ft.—Mica schist.

1,070ft. to 1,072ft.—Dense quartzite with fine disseminated pyrites.

1,072ft. to 1,080ft.—Mica schist.

1,080ft. to 1,083ft.—Quartzite.

No. 5 BORE.

Angle of bore 43° ; bearing S. 20° W. (magnetic).

0ft. to 8ft.—Surface loam, travertine limestone and clay.

8ft. to 18ft.—Red clay, then mica schist with small quartz veins. Country not making core.

18ft. to 55ft. 7in.—Mica schist with small quartz veins.

55ft. 7in. to 55ft. 11in.—Massive vein quartz.

55ft. 11in. to 157ft.—Mica schist.

157ft. to 160ft.—Quartz mica schist.

160ft. to 162ft.—Mica schist with lenticle of quartz and chalcopyrite.

162ft. to 163ft.—Quartz mica schist.

163ft. to 168ft.—Mica schist.

168ft. to 168ft. 6in.—Mica schist decomposed beside vein.

168ft. 6in. to 170ft. 2in.—Vein quartz with some undigested mica schist.

170ft. 2in. to 171ft.—Quartz mica schist with some pyrite.

171ft. to 190ft.—Mica schist.

190ft. to 191ft.—Pegmatite vein in mica schist.

191ft. to 248ft.—Mica schist.

248ft. to 249ft.—Pegmatite vein with pyrite.

249ft. to 250ft.—Mica schist.

250ft. to 255ft.—Mica schist with sporadic crystals of pyrite.

255ft. to 255ft. 6in.—Pegmatite vein.

255ft. 6in. to 266ft.—Pegmatised mica schist with blebs of pyrite.

266ft. to 269ft.—Mica schist showing chalcopyrite and pyrite, the latter fairly abundant.

269ft. to 292ft.—Mica schist.

292ft. to 292ft. 6in.—Vein quartz with some undigested mica.

292ft. 6in. to 305ft.—Mica schist.

305ft. to 316ft.—Quartz mica schist.

316ft. to 316ft. 1in.—Vein quartz.

316ft. 1in. to 332ft.—Mica schist.

332ft. to 333ft.—Vein quartz containing a little pyrite.

333ft. to 340ft.—Quartz mica schist.

340ft. to 365ft.—Mica schist.

365ft. to 365ft. 6in.—Quartzose vein matter with amphibole.

365ft. 6in. to 377ft.—Mica schist.

377ft. to 378ft.—Dense quartzite.

378ft. to 409ft.—Mica schist.

409ft. to 410ft.—Quartz mica schist with quartzose lode matter containing pyrite.

410ft. to 410ft. 6in.—Quartz and mica schist.

410ft. 6in. to 448ft.—Mica schist.

448ft. to 448ft. 4in.—Quartz vein with pyrite and undigested mica.

448ft. 4in. to 461ft.—Mica schist.

461ft. to 462ft.—Quartzite with vein quartz.

462ft. to 464ft.—Mica schist.

464ft. to 464ft. 8in.—Quartzite.

464ft. 8in. to 476ft.—Mica schist.

476ft. to 477ft.—Vein quartz in mica schist.

477ft. to 481ft. 6in.—Mica schist.

481ft. 6in. to 482ft. 6in.—Vein quartz, unmineralised.

482ft. 6in. to 494ft.—Quartz mica schist.

494ft. to 508ft.—Mica schist with crystals of pyrite.

508ft. to 514ft.—Quartzite with pyrite on joints.

514ft. to 545ft.—Mica schist.

545ft. to 545ft. 1in.—Vein quartz with pyrite and chalcopyrite.

- 545ft. 1in. to 547ft.—Mica schist and seam showing chalcopryite and pyrite at 547ft.
- 547ft. to 552ft.—Mica schist with pyrite.
- 552ft. to 555ft.—Mica schist.
- 555ft. to 555ft. 1in.—Vein quartz with traces of pyrite.
- 555ft. 1in. to 560ft.—Mica schist with small quartz veins.
- 560ft. to 560ft. 6in.—Vein quartz in mica schist.
- 560ft. 6in. to 564ft.—Mica schist.
- 564ft. to 564ft. 6in.—Vein quartz in mica schist.
- 564ft. 6in. to 570ft.—Mica schist.
- 570ft. to 570ft. 2in.—Vein quartz, unmineralised.
- 570ft. 2in. to 580ft.—Mica schist.
- 580ft. to 580ft. 6in.—Vein quartz.
- 580ft. 6in. to 586ft.—Mica schist.
- 586ft. to 587ft.—Vein quartz with undigested mica schist.
- 587ft. to 617ft.—Mica schist.
- 617ft. to 617ft. 2in.—Vein quartz showing a little pyrite.
- 617ft. 2in. to 622ft.—Mica schist.
- 622ft. to 625ft.—Quartzite.
- 625ft. to 628ft.—Mica schist with traces of chalcopryite on joints.
- 628ft. to 629ft.—Quartzose vein matter with a little pyrite.
- 629ft. to 635ft.—Mica schist
- 635ft. to 635ft. 2in.—Vein quartz with pyrite.
- 635ft. 2in. to 645ft.—Mica schist.
- 645ft. to 650ft.—Quartzite.
- 650ft. to 657ft.—Quartzite schist with traces of pyrite.
- 657ft. to 658ft.—Vein quartz, unmineralised.
- 658ft. to 659ft.—Quartzite.
- 659ft. to 664ft.—Mica schist.
- 664ft. to 664ft. 6in.—Quartzite with sheaves of mica.
- 664ft. 6in. to 674ft.—Mica schist.
- 674ft. to 667ft.—Quartzite with a little mica.
- 667ft. to 683ft.—Mica schist.
- 683ft. to 695ft.—Mica schist (quartzose).
- 695ft. to 695ft. 5in.—Quartz showing pyrite and chalcopryite and undigested mica.
- 695ft. 5in. to 702ft.—Quartzite.
- 702ft. to 714ft.—Quartz mica schist.
- 714ft. to 723ft.—Mica schist.
- 723ft. to 723ft. 9in.—Vein quartz and undigested mica schist.
- 723ft. 9in. to 730ft.—Mica schist.
- 730ft. to 735ft.—Quartzite.
- 735ft. to 776ft.—Mica schist.
- 776ft. to 783ft.—Quartz mica schist.
- 783ft. to 800ft.—Mica schist.

NO. 6 BORE.

One hundred and sixty feet S.S.W. of No. 5 bore; angle of bore 43°; bearing 20° E. of N. (magnetic).

- 0ft. to 4ft.—Surface loam and travertine limestone.
- 4ft. to 12ft.—Travertine limestone with little clay.
- 12ft. to 13ft.—Vein quartz, unmineralised.
- 13ft. to 17ft.—Decomposed quartz mica schist.
- 17ft. to 70ft.—Semi-decomposed mica schist, becoming more compact with depth.
- 70ft. to 70ft. 6in.—Pegmatite vein.
- 70ft. 6in. to 88ft.—Mica schist
- 88ft. to 88ft. 6in.—Unmineralised vein quartz.

- 88ft. 6in. to 123ft.—Mica schist.
 123ft. to 123ft. 2in.—Unmineralised vein quartz.
 123ft. 2in. to 148ft.—Mica schist.
 148ft. to 148ft. 5in.—Unmineralised vein quartz.
 148ft. 5in. to 152ft.—Mica schist.
 152ft. to 153ft.—Brecciated mica schist with lenticles of quartz.
 153ft. to 166ft. 8in.—Mica schist.
 166ft. 8in. to 171ft. 8in.—Brecciated lode matter consisting of quartz, pyrite, chalcopyrite, and mica schist, containing no gold and 0·2 per cent. copper.
 171ft. 8in. to 186ft.—Mica schist with a little pyrite.
 186ft. to 187ft.—Unmineralised vein quartz.
 187ft. to 200ft.—Mica schist.
-

MILTALIE MINE.

- No. 3 Bore is situated 153ft. N. from No. 1 Bore, and 240ft. from the outcrop, and was located so as to cut the lode at 200ft; angle of bore 20ft. in 100ft.
 0ft. to 2ft.—Soil and limestone rubble.
 2ft. to 39ft.—Pink gneiss of medium to coarse grain.
 39ft. to 40ft.—Pale-grey highly felspathic gneiss.
 40ft. to 42ft.—Friable gneiss, giving no core but only coarse angular fragments.
 42ft. to 54ft.—Grey and pink gneiss with limonite stains on the joints and cleavages.
 54ft. to 55ft.—No core. Friable grey mica schist.
 55ft. to 69ft.—Grey gneiss of medium grain.
 69ft. to 70ft.—Pegmatite with acicular crystals of tourmaline.
 70ft. to 82ft. 6in.—Pink and grey gneiss with rather indefinite foliation.
 82ft. 6in. to 84ft. 6in.—Grey mica schist.
 84ft. 6in. to 89ft. 6in.—Pink and grey gneiss.
 89ft. 6in. to 90ft.—Mica schist showing signs of felspathisation.
 90ft. to 140ft.—Grey gneiss of medium grain.
 140ft. to 142ft. 6in.—Grey gneiss much broken and carrying a few crystals of pyrite.
 142ft. 6in. to 145ft.—Broken grey gneiss and sand with small crystals of pyrite.
 145ft. to 167ft.—Grey gneiss, massive, medium grain.
 167ft. to 175ft.—Dense grey gneiss.
 175ft. to 200ft.—Broken grey gneiss.
-

YALPOODNIE MINE.

- No. 1 Bore, situated on main road between Port Lincoln and Port Augusta, 22ft. to the N.W. of the cemetery reserve and 158ft. from the S.W. corner of the cemetery, Hundred of Hawker; angle of bore, 75°; bearing, E.S.E.
 0ft. to 2ft.—Soil.
 2ft. to 3ft.—Clay.
 3ft. to 30ft.—Coarse quartz, felspathic grit, and a stone of dense quartz.
 30ft. to 32ft.—Brownish yellow clay and quartz pebbles.
 32ft. to 48ft.—Limonite and calcareous fragments.
 48ft. to 93ft.—Decomposed gneissic material (mica and quartz grains and kaolin), also part soluble in HCl with evolution of carbonic acid gas.
 93ft. to 113ft.—Mica schist.

- 113ft. to 114ft.—Half-inch vein of semi-decomposed felspar running almost with core.
- 114ft. to 131ft.—Mica schist.
- 131ft. to 167ft.—Quartz mica schist with small pyrite crystals and plates of pyrite on laminae.
- 167ft. to 230ft.—Felspathised schist, &c., dark-grey to pink in color according to prevalence of mica or felspar.
- 230ft. to 237ft.—Somewhat banded grey mica schist, felspathisation not pronounced.
- 237ft. to 247ft.—Mica schist, medium grain.
- 247ft. to 267ft.—Mica schist, medium grain, shows a little pyrite on foliation planes.
- 267ft. to 273ft.—Coarse-grained pink gneissic rock, foliation indistinct.
- 273ft. to 327ft.—Pegmatised mica schist, red stains of hæmatite on foliation planes and transverse joints. All this rock is banded by felspathisation or pegmatisation.
- 327ft. to 347ft.—Felspathised mica schist.
- 347ft. to 370ft.—No core. Sediment consists mainly of quartz and mica, probably from mica schist.
- 370ft. to 372ft.—Return water black, then clear, then black again (fragments of quartz and mica from mica schist, probably with graphite).
- 372ft. to 384ft.—Felspathised mica schist, with vein matter in ill-defined and irregular seams.
- 384ft. to 401ft.—Gneiss.
-

PLAN
SHOWING POSITION OF BORES AT
CALCOOKRA MINE

H^d of Hawker

Sec. 172

No. 4 Bore

Shafts

Sec. 513

Shaft

No. 2 Bore



No. 3 Bore

No. 1 Bore

Sec. 470

SCALE

FT 50 40 30 20 10 0 50 100 150 200 FT

Keith Ward.

SUPERVISOR OF BORING OPERATIONS

SOUTH AUSTRALIA
DEPARTMENT OF MINES
Nº1 BORE CALCOOKRA MINE

Direction of Bore. 332° Mag. Hundred of HAWKER Location { Distant 134 ft. from the N.W. corner
Angle of Bore 78.28 Section No. 470 of Section No. 470 on a Magnetic
Bearing of 147°

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION of ROCK	REMARKS
2.		2.	Surface loam	
14.		12.	Schist and broken quartz.	
14. 6		6.	Quartzite.	
		29. 6	Schist country with bars of quartz.	
44.				
60.		16.	Calcite and quartz.	
80.		20.	Hard broken quartzite	
100.		20.	Mixture of micaceous schist, calcite and quartz.	
113. 6		13. 6	Schist and calcite.	
128.		14. 6	Broken quartzite.	
		22.	Micaceous schist, calcite and quartz	
150.				
151. 3		1. 3	Solid quartz.	
		33. 9	Broken quartzite country showing pyrites from 154 ft.	
185.				
		23.	Schist and quartzite.	
208.				
213.		5.	Calcite and quartz carrying a little pyrites.	At 216 ft. the country appears to turn in the opposite direction dip parallel with the bore.
219.		6.	Very broken schist and quartzite country.	
		54.	Calcite and quartz.	
273.				
		31.	Schist with occasional bars of quartz and calcite.	
304.				
306.		2.	Quartz.	
		82	Micaceous schist quartz and calcite.	
388.				

Date completed ..17.10.14..

C.F. Duffield

Foreman

L. Keith Ward

Supervisor of Boring Operations.

SOUTH AUSTRALIA
DEPARTMENT OF MINES
Nº2 BORE CALCOOKRA MINE

Direction of Bore 320 Mag.

Manner of HAWKER

 Location { Distant 51ft from the N.W. corner
of Section No 470. on a Magnetic
Bearing of 151°.

Angle of Bore 66° 25.

Section No. 470.

DEPTH FATHOMS	SECTION	THICKNESS FATHOMS	DESCRIPTION OF ROCK	REMARKS
0		0		
60.		60.	Micaceous schist	
100.		40.	Broken calcite and quartz mixed with a little schist.	
106		6	Schist country.	
110.		13.	Quartz and calcite.	
124.		5.	Frangible lode material heavily charged with iron pyrites.	
127.		13.	Quartzite showing pyrites.	
140.		3.	Schist country.	
		155.	Schist calcite and quartz.	
275.				

Date completed 12-12-1914.

 G.F. Duffield.
Foreman

 L. Keith Ward.
Supervisor of Boring Operations.

SOUTH AUSTRALIA
DEPARTMENT OF MINES

N^o3 BORE CALCOOKRA MINE

Direction of Bore... 323 1/2 Mag... Hundred of HAWKER... Location { Distant 190ft from the N.W. corner
Angle of Bore... 72.27. In road N.E. of Section No. 410... of Section No. 470 on a Magnetic...
Bearing of 114°

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION OF ROCK	REMARKS
5		5.	Surface loam and limestone rubble.	
30		87.	Micaceous schist with bars of quartz and calcite.	
510		220.	Biotite and siliceous schist with occasional bars of quartz.	

Data completed 27.2.15.....

C.F. Duffield.....
Foreman.

L. Keith Ward.....
Supervisor of Boring Operations.

SOUTH AUSTRALIA
DEPARTMENT OF MINES

N^o 4 BORE CALCOOKRA MINE

Direction of Bore 144° Mag. Hundred of HAWKER Location { Distant 14 f. from the N.W. corner
Angle of Bore 66° 25' Section No. 172 of Section No. 470 on a Magnetic
Bearing of 308°

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION of ROCK	REMARKS
1		1'	1. Loam	
5		8.	8. Micaceous schist.	
		28.	28. Decomposed rock containing carbonate of lime.	
37		4.	4. Slate	
41				
		89.	89. Biotite schist with hard bars of siliceous pegmatite	
130				

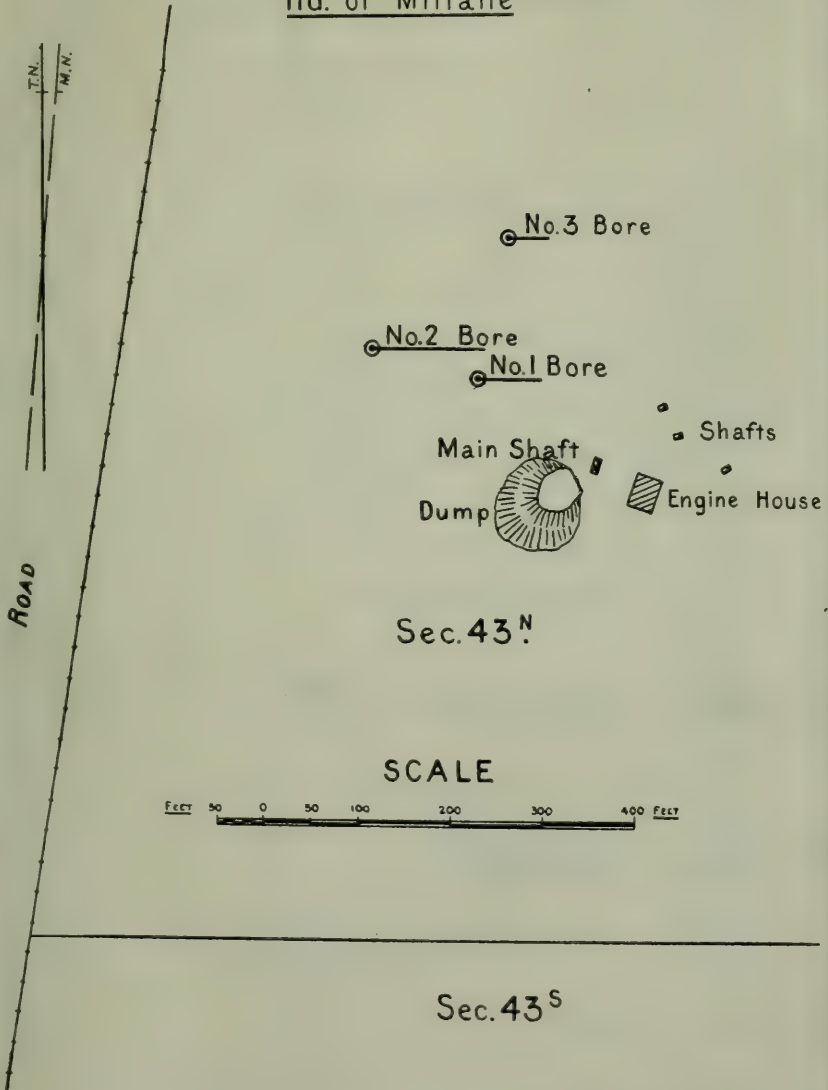
Date completed 24.3.15

C. F. Duffield
Foreman

L. Keith Ward
Supervisor of Boring Operations

PLAN
SHOWING POSITION OF BORES AT
MILTALIE MINE

Hd. of Mitalie



L. Keith Ward.
 SUPERVISOR OF BORING OPERATIONS

SOUTH AUSTRALIA
DEPARTMENT OF MINES
N^o 1 BORE MILTALIE MINE

Direction of Bore—East
Angle of Bore 78° 28'

Hundred of MILTALIE
Section No. 43^N

Location { About 155 feet from the Main Shaft
on a Magnetic Bearing of 303°

DEPTH FATHOMS SURFACE	SECTION	THICKNESS FT. IN.	DESCRIPTION of ROCK	REMARKS
5		5	Limestone	
141		136	Felspathised schist and gneiss.	
168		27	Quartzite	
231		63	Highly felspathic biotite schist.	
235		4	Soft lode material charged with iron pyrites.	
240		5	Soft broken country	
250		10	Gneiss.	
277		27	Highly felspathic biotite schist.	
282		5	Siliceous biotite schist.	
283		1	Siliceous and felspathic schist.	
287		4	Felspathised schist.	
289		2	Siliceous pegmatite.	
330		41.	Felspathised schist.	
338		8	Soft broken sandstone.	
341		3	Gneiss	

Date completed 6 B-15.

C.F. Duffield.
Foreman

L. Keith Ward.
Supervisor of Boring Operations

SOUTH AUSTRALIA
DEPARTMENT OF MINES
Nº2 BORE MILTALIE MINE

Direction of Bore East Hundred of MILTALIE Location About 117 feet from No. 1 Bore, on a
Angle of Bore 78.26' Section No. 4.3 N Magnetic Bearing of 283°

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION of ROCK	REMARKS
FT. IN.		FT. IN.		
5 0		3	Soll. clay, travertine limestone rubble Decomposed micaceous schist.	
60		52	Coarse-grained pinkish gneiss, the foliation planes (and cleavage) being inclined at 45° to direction of bore.	
		51	Similar to above but finer grained	
151 154 162		3	Pinkish-grey granite of medium grain with pyrite in narrow veinlets.	
		8	Dark grey fine-grained gneiss with pyrite	
		55	Pink coarse-grained gneiss.	
217 219		2	Dark greenish-grey mica schist	
		40	Pink coarse-grained gneiss.	
268		35	Coarse pale-grey gneiss.	
303		117	Coarse pink gneiss with sporadic crystals of pyrite	
420		150	Medium grained grey gneiss with scattered crystals of pyrite.	
570				

Date completed 2.12.15

C.F. Duffield
foreman

L. Keith Ward
Supervisor of Boring Operations

SOUTH AUSTRALIA
DEPARTMENT OF MINES

No. 3 BORE MILTALIE MINE

Direction of Bore East. Hundred of MILTALIE. Location About 153 feet from No. 1 Bore on a...
Angle of Bore 78° 28'. Section No. 43. Magnetic Bearing of 8°

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION OF ROCK	REMARKS
1		2	Soil and limestone rubble	
33		37	Pink gneiss of medium to coarse grain.	
40				
42				
54				
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Date completed 19-2-16...

C.F. Duffield.
Foreman.

Keith Ward.
Supervisor of Boring Operations.

SOUTH AUSTRALIA
DEPARTMENT OF MINES
No. 1 YALPOODNIE BORE

Direction of Bore E.S.E. Hundred of HAWKERAngle of Bore 75°

Location

In road, 22 ft. from the N.W. boundary
and 90 ft. from the N.W. corner of
Cemetery Reserve.

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION OF ROCK	REMARKS
ft. in.		ft. in.		
5		3.	Soil and clay.	
		27.	Coarse quartz, feldspathic grit and quartz and a stone of fine dense quartz.	
30				
32		2.	Brownish yellow clay and quartz pebbles.	
46		16.	Limonite and calcareous fragments.	
			Decomposed gneissic material (mica and quartz grains and kaolin) also part soluble in HCl. with evolution of CO_2 .	No core
		45.		
93				
		20.	Mica schist.	
113		1.	Half inch vein of semi-decomposed felspar running almost with core.	
114		17.	Mica schist.	
131				
		36.	Quartz mica schist with small pyrite crystals and plates of pyrite on laminae.	
167				
		63.	Feldspathised schist etc, dark grey to pink in color according to prevalence of mica or felspar.	
230				
237		7.	Somewhat banded grey mica schist. Feldspathisation not pronounced.	
		30.	Medium grained mica schist. Shows a little pyrite on foliation planes.	
267.			Coarse grained pink gneissic rock, foliation indistinct.	
275		6.		
		54.	Pegmatized mica schist. Red stains of haematite on foliation planes and transverse joints. All this rock is banded by feldspathisation or pegmatisation.	
327.		20.	Feldspathised mica schist.	
347				
		23.	Sediment consists mainly of quartz and mica, probably from mica schist.	No core.
370		2.	Fragments of quartz and mica from mica schist probably with graphite.	Return water black then clear then black again.
372			Feldspathised mica schist with vein matter in illdefined and irregular seams.	
384.		12.		
401		17.	Gneiss.	

Date completed 19.5.16

C.F. Duffield
Foreman.

Keith Ward
Supervisor of Boring Operations.

SUBSIDIES.

The Legislature provided in the Mining Act, 1893, and in previous measures for the encouragement of mining.

The following schedule shows what subsidies have been paid from the inception of the system to June 30th, 1916, and the sums repaid. In the ordinary way these repayments are made from profits—50 per cent. of such profits being devoted to repayments. In two instances only have the profits won enabled full repayments to be accomplished—the Crystal Mine, at Echunga, which repaid £76 7s. 6d. from that source, and the once-famous New Alma and Victoria Mine, Waukaringa, which repaid in full the first subsidy, £3,000. The repayment of £2,100 by the Hamley Company was made on the sale of the property to the Wallaroo and Moonta Co. The remainder of the recoveries was derived from sales of mining plant held as security. The total of the subsidies advanced is £63,353 14s. 5d., of which £9,787 19s. 4d. has been recovered, leaving a debit balance of £53,565 15s. 1d. Portion of this outstanding debt is represented by machinery that has fallen into the hands of the Government; add to this the value of the metals won, and the State in general will probably have benefited beyond the money value of the debit balance.

STATEMENT OF SUBSIDIES PAID FROM COMMENCEMENT TO
JUNE 30TH, 1916.

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.	Amount Repaid.
		£ s. d.	£ s. d.
Adelaide Crushing, Grinding, and Amalgamating Mill Co.	—	100 0 0	—
Algebuckina Gold Mining Syndicate	Algebuckina	52 10 11	52 10 11
Alma Extended Gold Mining Co.	Waukaringa	3,000 0 0	172 5 0
Backhouse, T. S.	Worturpa	100 0 0	—
Barossa Enterprise Gold Mining Coy.	Barossa, Hundred of ..	232 2 6	—
Belalie Copper Mining Syndicate	Bundaleer	392 12 3	—
Beltana Rapid Ore Treatment Syndicate ...	Near Beltana	596 8 4	—
Bevilaqua & Angel	Palmer (near)	57 18 0	—
Bird-in-Hand Gold Mining Co., Ltd.	Woodside	3,000 0 0	—
Blackfellow's Creek Gold Mining Co., Ltd. ...	Kuitpo, Hundred of ..	660 6 7	35 0 0
Callington Copper Mining Co.	Callington	148 8 7	15 0 0
Cockburn Copper Mining Co., N.L.	Mutooroo	273 18 5	173 13 8
Commonwealth Silver-lead Co., Ltd.	Strathalbyn, Hund. of	750 0 0	71 10 3
Copper Hill Mining Co., N.L.	Kadina	391 15 0	115 0 0
Cornwall Copper Mining Syndicate, N.L. ..	Kadina, Hundred of ..	500 0 0	—
Countess of Jersey Gold Mining Co., N.L. ...	Wadnaminga	321 0 0	—
Cowell Consolidated Silver and Copper Mines	Hds. Miltalie & Hawker	406 9 8	25 0 0
Currency Creek Copper Mining Co.	Currency Creek	28 6 5	20 0 3
Crystal Gold Mining Co.	Echunga	563 17 6	176 7 6
Davis, A. (Dorris Fabian Mine)	Leigh's Creek, Near ..	357 0 0	—
Ding Dong Copper Mining Syndicate	Kanmantoo, Hund. of	124 0 4	—
Duke of Cornwall Gold Mining Syndicate ..	Mount Pleasant	458 17 4	43 10 0
Eagle Silver Mining Co., Ltd.	Glen Osmond	500 0 0	—
Ediacara Consols Silver Mining Co., N.L. ...	Ediacara	651 12 1	465 17 0
Enterprise Copper Mining Co., N.L.	Barossa, Hundred of ..	150 0 0	9 16 0
Enterprise Excelsior (Barossa Amalgamated)	"	2,000 0 0	—
Eureka Gold Mining Co., Ltd.	Woodside	1,500 0 0	—
Fels, J. A. R. (Nichol's Nob Mine)	Leigh's Creek, Near ..	116 0 0	—
Fifth Creek Central Silver and Copper Mining Co., N.L.	Fifth Creek	253 2 4	—
Fortress Hill Mining Syndicate	Fortress Hill	60 0 0	—
Glenloth Mining, Battery, & Options Co., N.L.	Glenloth	515 4 7	515 4 7
Glenloth Wells Pioneer Blocks Co., Ltd.	"	100 0 0	22 18 5
Great Eastern Gold Syndicate, N.L.	Wadnaminga	300 0 0	—
Gumeracha Gold Mining Syndicate	Gumeracha	75 0 0	—
Golden Junction Gold Mining Co., N.L.	Hundred of Coglin ..	134 17 6	—
Golden Point Claims	Wonna	50 0 0	—

STATEMENT OF SUBSIDIES PAID—*continued.*

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.	Amount Repaid.
		£ s. d.	£ s. d.
Great Ironclad Gold Mining Co.	Teetulpa	218 6 9	—
Hakendorf, C. H., and Williams, J. (Glen- markie Mine)	Glenloth	221 17 6	—
Hamley Copper Mining Co.	Wallaroo	2,100 0 0	2,100 0 0
Homeward Bound and Klondyke Gold Mines, N.L.	Mannahill	192 17 1	35 18 9
Heithersay, J. (Kirkeeks Treasure Mine) ..	Waukaringa	819 8 0	—
Hunter Bros. (Lady Millicent Mine and Nuccaleena Mines)	Mochatoona	665 2 8	—
Ireby Gold Mining Syndicate	Mount Grainger	35 4 3	—
Kanappa Copper Mining Co.	Hundred Angas	146 19 11	1 5 0
Kanmantoo Copper Mines Syndicate, N.L. .	Kanmantoo	150 2 1	—
Kingsborough, W. A. (Benowrie Mine)	Near Cutana	31 18 6	—
Kirkeek's Treasure Gold Mining Co.	Waukaringa	691 8 1	—
King's Bluff G.M. Co., N.L.	Olary	622 0 8	—
Kohinoor Gold Mining Co., N.L.	Kangaroo Island	100 0 0	—
Kohinoor Mine (H. G. Taylor)	"	200 0 0	—
Lady Alice Gold Mining Co.	Barossa, Hundred of ..	1,797 2 3	—
Lady Franklin Syndicate	Port Lincoln	200 0 0	40 0 0
Leigh's Creek South Coal Mining Co., N.L.	Leigh's Creek	95 16 4	95 16 4
McMurtie's Claims	Kuitpo, Hundred of ..	199 19 11	—
Mingary Gold Mining Co.	New Luxemburg	400 0 0	—
Montacute Gold and Copper Mining Co., N.L.	Sixth Creek	400 0 0	—
Mount Victoria Mine	Bimbowrie	50 0 0	—
Mount Malvern Silver Mining Co.	Blackwood	491 3 6	—
Mount Malvern Silver-lead Mining Co., N.L.	Clarendon	1,539 6 4	—
Mount Pangæus Gold Mining Co.	Hahndorf (near)	56 1 4	—
Mount Monster Gold Mining Syndicate ..	Kuitpo, Hundred of ..	350 0 0	1 0 0
Mt. Grainger Ironclad Gold Mining Syn., Ltd.	Mount Grainger	21 18 10	—
Mount Torrens Gold Mining Co.	Mount Torrens	1,000 0 0	—
Mount Remarkable Mining Co., Ltd.	Wongyarra, Hund. of ..	122 8 1	15 0 0
Musgrave Ranges Prospecting Association ..	Musgrave Ranges	47 2 0	—
Mount Painter Corundum and Gem Syndicate	Mount Painter	47 3 1	—
Morning Star Gold Mining Co.	Teetulpa	68 4 6	—
Mutooroo Copper and Silver Mining Co., Ltd.	Mutooroo	500 0 0	500 0 0
Myrtle Gold Mines, N.L.	Hd. Cogliin	370 1 4	—
Nackara Proprietary Copper Mining Co., N.L.	Nackara	100 0 0	—
Nackara Proprietary Gold Mining Syndicate.	Nackara	100 0 0	—
New Banksia Gold Mining Syndicate	Nairne	250 0 0	—
New Alma and Victoria Gold Mining Co., Ltd.	Waukaringa	3,000 0 0	3,000 0 0
New Ajax Consolidated Gold Mining Co., N.L.	"	750 0 0	—
New Era Gold Mining Co., Ltd.	Woodside	1,000 0 0	—
New Glenloth Battery and Mining Co., N.L.	Glenloth	750 0 0	—
New Medora and Grainger Gold Mines Syn., N.L.	Mount Grainger	1,421 9 9	—
New Mingary Gold Mining Co.	New Luxemburg	250 0 0	—
New Mount Grainger Gold Mines, N.L.	Mount Grainger	393 7 1	220 0 0
Northern Mining and Smelting Co., N.L. .	Mount Rose	350 0 0	3 15 0
North Nairne Gold Mining Co.	Nairne	500 0 0	—
North-West and West Australian Pros. Co.	North-west of S.A. .	104 9 7	—
North-West Prospecting Association, N.L. .	Tarcoola	150 0 0	—
Nil Desperandum Teetulpa Devt. Co., N.L.	Teetulpa	64 14 4	20 5 6
Nilpena Copper Mining Co., Ltd.	Blinman	290 5 3	—
Olivaster Silver-Lead Mining Co., N.L.	Hundred Yankalilla ..	300 0 0	—
Onkaparinga Dredging and Mining Co., and Echunga Propy. Hydraulic Gold sluicing Co.	Biggs' Flat	1,050 0 0	700 0 0
Paull's Consolidated Copper Propy., N.L. .	Burr Well	525 0 0	16 13 0
Parara Mining Co., N.L.	Maitland	571 3 6	—
Paringa Mining Syndicate	Callington	399 16 8	244 0 0
Paringa and West Kanmantoo Consolidated Copper Mine, N.L.	"	1,144 3 4	10 5 0
Pioneer Gold and Copper Mining Syndicate	"	95 15 6	—

STATEMENT OF SUBSIDIES PAID—continued.

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.			Amount Repaid.		
		£	s.	d.	£	s.	d.
Polmear, W. J. L.	Kadina	800	0	0	—		
Port Lincoln Copper Co., Ltd.	Reedy Creek	500	0	0	—		
Prince Albert Mining Syndicate	Hundred Onkaparinga.	147	8	9	—		
Queen Bee Mining Co., N.L.	New Luxemburg	250	0	0	250	0	0
Quorn Manganese and Silver Mining Co. ...	Quorn	10	9	10	—		
Rapid Bay Silver Mining Co., N.L.	Yankalilla, Hund. of..	136	2	4	—		
Robertstown Bright Silver Lead Mines	Hd. Bright	170	5	11	—		
Royal Charlie Gold Mining Co.	Mannahill	153	18	5	—		
Rees, R., Ajax Mine	Waukaringa	604	14	5	—		
Sixth Creek Gold & Copper Mining Co., L.N.	Sixth Creek	161	1	11	—		
Stainbank, A. T.	Fifth Creek	70	14	11	—		
Sliding Rock Copper Proprietary, N.L.	Sliding Rock	2,000	0	0	27	17	0
Tarcoola Blocks Gold Mining Co., Ltd.	Tarcoola	3,995	5	2	150	19	11
Tarcoola Enterprise Gold Mining Co., N.L. ...	"	100	0	0	19	10	4
Tarcoola Proprietary Gold Mines, N.L.	Tarcoola	150	4	4	9	15	0
Teatree Gully Gold Mining and Pros. Assn.	Teatree Gully	234	5	7	—		
Teetulpa Mining and Crushing Co.	Teetulpa	349	11	4	—		
Teetulpa Prospecting Syndicate	"	49	15	6	—		
Tumby Bay Copper Mining Co., N.L.	Hutchison, Hund. of..	800	0	0	—		
Utica Copper Mining Co. N.L.	Burra	208	12	7	—		
Victoria Hill Amalgamated Gold Mining Syn.	Barossa, Hundred of ..	38	12	6	—		
Victoria Tower Mining Co., N.L.	Mannahill	345	18	9	90	0	0
Warrakimbo Propy. Copper Mining Synd. ..	Barndicoota, Hundred of	220	16	2	—		
Warra Warra Propy. Copper Mines, N.L. ...	Farina	322	4	11	322	4	11
Watt's Gully Gold Mining Co.	Gumeracha	50	0	0	—		
Watt's Gully Reef Claims	Gumeracha	50	0	0	—		
Wolters, F. C., & Co	Echunga	25	0	0	—		
Walleraro Central Mining Co., N.L.	Kadina	500	0	0	—		
Westward Ho Mine (Dr. H. Dixon)	Mannahill	1,000	0	0	—		
Wohler, H., & Co.	Myponga	20	0	0	—		
Wheal Turner Copper Mining Co., Ltd.	Prospecting on proposed line to Queensl'd Border	1,000	0	0	—		
Winnininnie Gold & Silver Propy. Co., N.L.	Winnininnie	86	3	6	—		
Woodside Boring and Mining Syndicate	Woodside	422	17	11	—		
Worturpa Exploration and Mining Co., Ltd.	Worturpa	800	0	0	—		
Yelta New Copper Mining Co., N.L.	Walleraro	1,000	0	0	—		
Young Bullfinch Gold Mining Co., N.L.	Talunga, Hundred of	146	3	4	—		
Totals	—	63,353	14	5	9,787	19	4

ACCIDENTS IN MINES AND QUARRIES.

A gratifying feature of our mining operations in mines and quarries is the infrequency of serious accidents. Act No. 858 of 1904, bringing quarries in the same category as mines as regards the control of the Department of Mines has been effective in safeguarding the interests of quarry-men. The following table gives the number of accidents in mines and quarries during the last ten years:—

ACCIDENTS IN MINES AND QUARRIES.

ACCIDENTS IN MINES.				ACCIDENTS IN QUARRIES.			
Year.	Total Number of Accidents Reported.	Number of Persons Injured.	Number of Persons Killed.	Year.	Total Number of Accidents Reported.	Number of Persons Injured.	Number of Persons Killed.
1906	3	—	3	1906	1	1	—
1907	10	4	6	1907	3	1	2
1908	5	4	1	1908	—	—	—
1909	6	5	1	1909	1	1	—
1910	6	3	3	1910	2	1	1
1911	2	—	2	1911	—	—	—
1912	3	2	1	1912	2	—	2
1913	10	8	2	1913	—	—	—
1914	3	2	1	1914	3	2	1
1915	3	—	3	1915	3	2	1
*1916	1	—	1	1916	—	—	—

* First six months of 1916.

ASSAYS AT SCHOOL OF MINES.

NUMBER OF ASSAYS MADE FOR PUBLIC PURPOSES AT THE SCHOOL OF MINES ASSAY DEPARTMENT DURING THE SIX MONTHS ENDED JUNE 30TH, 1916.

	1916.					
	January.	February.	March	April.	May.	June.
Department of Mines	87	72	119	27	11	228
Public assays.....	51	53	94	96	111	89
Totals.....	138	125	213	123	122	317

DECENNIAL RETURN SHOWING, SO FAR AS CAN BE ASCERTAINED
OUTPUT AND VALUE OF VARIOUS METALS AND MINERALS
PRODUCED IN SOUTH AUSTRALIA.

Year.	GOLD.		SILVER.		SILVER LEAD ORE.		COPPER.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ounces.	£	Ounces.	£	Tons.	£	Cwts.	£
1906	8,037	27,000	801	104	—	—	164,160	718,609
1907	5,609	20,540	5,845	780	1,000	11,000	158,620	690,000
1908	2,908	12,300	—	—	900	9,000	112,554	338,000
1909	7,111	30,206	1,660	167	70	416	113,940	334,584
1910	6,603	28,000	6,250	625	25	22	102,040	306,120
1911	3,537	15,000	1,400	140	—	—	118,440	332,530
1912	6,592	28,000	2,700	326	—	—	125,900	461,500
1913	6,556	27,800	2,650	300	153	1,100	143,222	488,986
1914	6,258	26,581	3,006	314	18	215	137,614	417,487
1915	6,081	25,830	2,462	277	59	625	154,506	561,247
Totals....	—	241,257	—	3,033	—	22,378	—	4,649,033

Year.	COPPER ORE AND REGULUS.		LEAD.		IRONSTONE FLUX.		LIMESTONE FLUX.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Cwts.	£	Tons.	£	Tons.	£
1906	—	—	1,000	550	75,226	33,852	31,940	4,791
1907	—	—	—	—	84,600	38,100	31,100	5,800
1908	—	—	—	—	88,000	39,600	29,500	6,000
1909	1,230	4,003	140	90	16,120	8,296	13,765	2,464
1910	—	*9,350	400	260	46,200	21,945	18,600	3,720
1911	—	*11,103	—	—	42,300	26,400	28,700	7,175
1912	—	*10,192	—	—	42,200	26,375	50,600	12,500
1913	—	*8,308	—	—	60,658	37,911	44,300	11,075
1914	—	*8,910	—	—	42,622	37,137	54,054	16,892
1915	—	*13,490	—	—	237,375	264,612	71,723	22,413
Totals	—	65,356	—	900	—	534,228	—	92,830

Year.	PHOSPHATE ROCK.		CRUDE SALT.		OTHER METALS AND MINERALS.	Total Value.
	Quantity.	Value.	Quantity.	Value.	Value.	
	Tons.	£	Tons.	£	£	£
1906	5,850	5,850	55,000	27,500	2,209	820,465
1907	8,000	8,000	75,000	37,500	2,500	814,220
1908	11,000	11,000	75,000	37,500	4,500	457,900
1909	3,772	3,697	51,407	25,594	3,873	413,390
1910	5,200	5,200	54,000	27,000	†13,600	415,842
1911	5,800	5,800	65,000	40,600	†11,319	450,037
1912	6,100	6,100	64,300	40,187	†10,490	595,670
1913	5,950	6,545	65,000	48,750	†11,851	642,626
1914	6,083	6,691	65,000	48,750	†37,378	600,355
1915	4,614	5,536	64,000	80,000	†27,855	1,001,885
Totals	—	64,419	—	413,381	125,575	6,212,390

Bluestone, £5,980; Sulphuric Acid, £3,370. † Including Gypsum, £9,000; Pyrites, £3,270.

" £4,163

" £6,940

"

" £7,275

" £2,580

" £2,550

" £7,642

"

" £9,000

" £325

" £7,963

"

" £5,362; Radium and Radio-Active Material, £3,620.

" —

" £8,910

"

{ £12,207; Kaolin, £16,382.

" £69

" £13,421

"

{ Radium and Radio-Active Material, £5,215.

£17,413; Kaolin, £1,934; Fireclay, £5,374;

Barytes, £1,320.

REPORTS FORMING ADDENDA TO THE RECORD OF MINES.

REPORTS

BY

The Government Geologist (L. Keith Ward, B.A., B.E.).

REPORT ON PROSPECTING OPERATIONS AT CALLAWONGA CREEK.

LOCALITY—SOUTH.

The recent extraordinary increase in the demand for tungsten minerals for use in the preparation of munitions of war has attracted the attention of prospectors to the Callawonga Creek district. In fact there has been more work done within the past few months on the area within which the tungsten-bearing veins occur than during the whole period since the discovery of the tungsten veins in 1893.

The tungsten-bearing mineral occurring at this locality is a variety of wolframite known as ferberite. This mineral differs from wolframite in that it is a tungstate of iron instead of a tungstate of iron and manganese (wolframite). The valuable ingredient of the mineral is the tungstic acid, of which pure ferberite contains a little over 70 per cent.

At Callawonga Creek the ferberite occurs in siliceous veins which mark a transitional stage between the pegmatite dykes and normal quartz veins. Acicular crystals of tourmaline are abundant in the veins, and mica is present in small amount. Felspar, for the most part more or less completely decomposed into kaolin, is a noticeable ingredient of the tungsten-bearing veins of the district under discussion, and is regarded by prospectors as a favorable sign. It certainly appears that the shoots or pockets of ferberite are closely associated with felspar.

The distribution of the ferberite is irregular, and the shoots hitherto located are small. The ferberite is for the most part unaltered by weathering, but a few patches have a cellular structure, and tungstic ochre is deposited in the cavities. A few feet below the surface the veins carry pyrite, which at the outcrop is replaced by limonite. Those portions of the veins that are cellular in structure, and that have the cavities more or less completely filled with limonite are found, on being dollied, to contain finely divided gold.

These metalliferous veins are enclosed within a crystalline micaceous sandstone which dips towards the south-west at low angles. The weathering and degradation of this rock has resulted in the disintegration of the veins and subangular blocks, and fragments of ferberite have been scattered through the soil. Trenching at the spots to which these lode-sheddings have been traced has resulted in the discovery of a vein system, of which many members have a N.W.-S.E. strike. Most of the veins are vertically disposed or nearly so, but some of the subsidiary ones are inclined at various angles to the horizon. The veins that have hitherto been proved to carry ferberite are of variable width—from a few inches up to a maximum of 6ft.

The attention of the prospectors has been almost entirely given to the opening up of the veins. The possible occurrence of alluvial ferberite and gold in the creek wash immediately to the westward of the veins should not be overlooked, and it would be well to test this alluvial ground during the summer season.

At the present time prospecting operations are being carried out on two properties called respectively the Queen Mary and the Gaba Tepe. The former of these was the first to be worked, and has contributed the greater portion of the small total output of the field to date.

On the Queen Mary property mining operations have been temporarily suspended on the large lode striking S. 10° E., and which was the principal scene of mining operations when the area was examined by the Assistant Government Geologist in September, 1915 (*vide* Review No. 23, p. 42). Since that examination was made a further shaft was sunk to a depth of 36ft., and the vein in the bottom of the shaft is said to contain ferberite in appreciable quantity. Several tons of vein-matter containing a fair proportion of ferberite and won from these workings are stacked at the surface. The new shaft as well as that which was formerly sunk a few yards to the northward have become partly filled with water owing to the transfer of operations to another portion of the property.

The new work now in progress consists of following the veins by means of open cuts into the hillside. The principal cutting has revealed the best pocket of ferberite yet located in place. This shoot is only partly exposed and occurs in a vein a few inches wide with a strike bearing E.S.E.-W.N.W. and a dip to the S.S.W. at 60°. Other small stringers of quartzose vein-matter carrying ferberite, felspar, and tourmaline are partly exposed in the same cutting on the hanging wall side of the vein mentioned. Sixteen hundredweights of ferberite have been won and shipped from the property as the result of recent work.

The Gaba Tepe workings consist principally of three open cuts into the hillside on three vertical lodes, which all strike N.W.-S.E., the south-westerly one being 30ft. and the north-easterly one 35ft. from the central body.

Most attention has been given to the south-westerly lode, and work has been carried to a total depth of 25ft. The lode is constituted of several component portions, which have a lenticular form and which overlap one another. The total width of the formation as a whole is over 6ft. in the widest place, and the lenses have a maximum thickness of 2ft. The ferberite is sparingly distributed in small shoots which are disposed transversely to the veins in which they occur. Three hundredweights of ferberite in all have been recovered from these workings, whence a considerable amount of vein-matter has been removed. There is still ore standing in the lode ready to be broken down, but its quantity cannot be estimated.

Superficial prospecting to the eastward of these veins has proved that ferberite occurs still higher up the slopes of the hill, but the actual veins which have shed the shod stones have not yet been located.

On both properties there is ample scope for more extensive prospecting, and from the exposures of vein-matter now available for inspection it would appear wisest to carry out more shallow prospecting before planning any further work in depth. The two attempts to follow the main vein on the Queen Mary Mine downwards have not been carried to any conclusive end. Shafts only a few yards apart cannot prove much of a lode, and the energy and capital expended on shaft-sinking would probably be better utilised by driving on the lode from either one of the shafts. Only where the ore has been proved to occur in pipes of small horizontal extent, but continuous in depth, can it be regarded as sound policy to sink on each individual shoot. In the case of the area under discussion, it appears that prospecting in a horizontal direction is quite as important as that in a vertical direction, and for this reason it would be well to concentrate effort, first of all, on the shallow prospecting of several veins with the object of selecting the most favorable locality for deeper work. (29-2-16.)



A Cliff Section, showing the Structure of the Consolidated Dune Material,
Cape Northumberland, Hundred of MacDonnell.



The Dune Surface, near Corattum, Hundred of Kongorong.

Face page 41.

REPORT ON THE PROSPECTS OF OBTAINING SUPPLIES OF PETROLEUM BY BORING IN THE HUNDRED OF KONGORONG.

LOCALITY—SOUTH-EAST.

Acting upon instructions from the Honorable the Minister of Mines the writer made a visit of inspection to that portion of the hundred of Kongorong to which attention has recently been drawn by reports of seepages of petroleum.

The supposed seepage occurs in the sea a little below the level of low tide at Pelican Point, which is a small low-lying promontory a mile and a half to the S.E. of Cape Banks, and 20 miles to the W.S.W. from Mount Gambier. When news of this supposed seepage was received a syndicate was formed in Mount Gambier with the object of raising capital to bore in the vicinity, and an application was made for the inspection upon which this report is based. A considerable area, both to the N. and to the S. of the particular district to which notice has been drawn, was traversed by the writer. The data acquired during this investigation throw no new light upon the general conception of the geological structure of the region, and the conclusions arrived at entirely corroborate the judgment that has been expressed by Dr. Wade with regard to the prospects of obtaining oil by boring. In view of the recent publication of this report it is not considered necessary to give more than a very brief account of the geology of the region.

The writer discovered no trace of evidence during the course of his investigation that might, on more detailed examination, afford indications of the structural features or the character of the rock formations that lie beneath the polyzoal limestone. The three shallow borings in the N. part of the hundred of Young have penetrated to a depth of less than 100ft. below this limestone horizon, and have shown beds of sand and clays (the latter being lignitic in part) to be the immediately underlying formations. The foundations upon which these sediments rest are not known.

Over a wide area the polyzoal limestone formation occurs at the surface. Flint is developed extensively at or near the upper limit of the formation, and the tabular blocks of flint occur at the surface over considerable areas. In places the soft polyzoal limestone is overlain by dolomite, the color of which ranges from white through various shades of yellow and brown to red.

On the limestone and dolomite lie the siliceous and calcareous sands of a great series of ancient sand dunes. These dunes were, at the time of their aggregation, on the shore line, but the progressive rising of the S.E. portion of the State from the sea has left a well-defined zonal system of stranded dunes arranged in lines that conform in orientation with the existing coastline.

The materials constituting these dunes are so arranged that it is quite apparent that they have been accumulated by the action of the wind. The general outlines of the stranded dunes themselves are precisely those of the dunes of unconsolidated sand such as now fringe the shores of the State in very many places. Being largely composed of shell fragments the older dunes have become consolidated by the solution and redeposition of carbonate of lime; but this redistribution of material has not proceeded far enough to mask the structural features indicative of origin. The ridges of dune materials are separated by plains, and the width of both the ridges and the plains is very variable. Where large aggregations of dune material are developed it is noticeable that there is at some places a tendency to arrangement in parallel ridges separated by narrow troughs. Although the nature and origin of these ancient coastal dunes is perfectly obvious to the trained observer, they have been regarded as having been produced by folding of the strata. The internal structure of the dunes, their outward form, and the obvious physiographical history of the region all bear indisputable witness to the fact that these zonal ridges or "ranges" are superficially imposed upon beds with which they are unconformable.

The discovery which has led to the recent revival of interest in the district is one which has features in common with other reported discoveries at various places on the South Australian coast. Soft asphaltic bitumen was found at Pelican Point, and it was assumed that this material was "oozing out of the rock." The locality has since been watched carefully, and no more of the material has been obtained. The asphaltum was not chemically examined at the time of its discovery in October 1915, and the finder states that the sample had become hard by the time when it passed out of his hands. When it reached the Government Analyst's office the sample had the physical consistency of thick treacle. It is therefore by no means certain that the character of the sample had not been altered between the time of its discovery and its delivery to the analyst, an uncertainty that is not dissipated by the results of the chemical investigation itself.

In the opinion of the writer no importance whatsoever can be attached to this discovery. The facts of occurrence appear to have been misinterpreted in this case, as in many others.

The geological structure of the region is such that no recommendation in favor of boring can be given. The proposal to bore for petroleum in this area must be regarded as a venture so highly speculative as to offer no inducement to the investor. Perhaps the nature of the chances involved can best be understood by means of a simple illustration:—

Suppose a page of printed matter to be covered with a sheet of opaque blotting-paper, and a pin to be thrust through the blotting-paper into the printed sheet below. It will at once be appreciated that the chances of penetrating any given letter—say W—are remote indeed. Suppose, moreover, that the letterpress on the printed sheet may be printed in any language. If the language should happen to be French (in which the letter W is practically non-existent) the chances in favor of the penetration of a W by the pin are almost nil.

Such are the chances to be faced in probing for petroleum in a region where all underlying features are obliterated by a cover which prevents their delineation, and wherein there is no certainty that any petroleum exists to be located.

It is at all times impossible to state in exact terms the quantitative value of risks in prospecting ventures. Much inevitably depends upon the judgment of the individual in any such attempt, but the method is of value in indicating the nature of a risk. In the opinion of the writer the chances of the successful outcome of a bore in search of petroleum in this region, on the evidence now available, are certainly not one in a thousand, probably not one in ten thousand, and possibly not one in a hundred thousand.

It will be seen that a chance of this order cannot carry a recommendation in favor of the expenditure of capital in searching for petroleum by boring.

The writer regrets that he cannot adopt a more hopeful attitude towards the proposal, but he is convinced that the proper recognition of the real character of this problem will be in the best interests of the community and the mining industry. It is at no time pleasant to declare one's belief in the futility of a prospecting venture, yet the duty of making such a declaration is seldom so clearly imposed by ascertainable facts as in the present instance. It is a matter for congratulation that the full investigation of the question by the Department of Mines was courted by those interested in the proposal to bore for petroleum.

At the same time the writer is compelled to issue to the general public a warning that there is every necessity to observe caution before accepting evidence or statements with regard to the matters under discussion. This warning is issued for the reason that coorongite has been picked up on the crests of the old consolidated sand dunes near Corattum, in the hundred of Kongorong. This substance has been assumed by some people to be a petroleum product, although its relationship to petroleum cannot be said to have been established.

Valleys in the Old Consolidated Sand Dunes, not Synclinal Troughs.



A Valley in the Dune Formation near Corattum, Hundred of Kongorong.



"Long Gully" or "Dry Creek," in the Hundred of Caroline, East of Mt. Schank.
Face page 42.]

The Eastern Front of the Woakwine "Range," which is a Long Consolidated Dune Ridge.



Looking South from Drain M, Hundred of Symon.



Looking North at Narrow Neck, Hundred of Rivoli Bay.

Face page 43.

The mode of occurrence of coorongite is known, and its discovery in loose fragments on the crest of a calcareous sand dune, at spots indicated to the writer by a representative of the syndicate which called for the investigation of this area, must be regarded as evidence that the material was deliberately placed there with fraudulent intent. This statement does not imply any culpability on the part of the members of the syndicate referred to, since their representative has openly expressed to the writer his doubt as to the genuine character of the occurrence.

Another warning that should be issued is of a more general character. Many wrong statements have been made as to the contents of official reports on the prospects of obtaining supplies of petroleum in this State. It cannot be urged too strongly that reference be made in all cases to these official reports themselves, or to this office, in place of accepting second-hand statements as to their contents. The Department of Mines is at all times ready to do all that lies in its power to satisfy serious inquirers, and is anxious that no hesitation should be felt in appealing for assistance or information. (10-4-16.)

REPORT

BY THE

Assistant Government Geologist (R. Lockhart Jack, B.E., F.G.S.).

KIRKEEK'S TREASURE MINE.

LOCALITY—NORTH-EAST.

REPORT SUPPLEMENTARY TO THAT IN REVIEW NO. 18.

The Mine.—Commencing at the eastern end of the main workings and W. of a deep trench which exposes the lode for a width of 10ft., the capping of travertine and rubbly lode material has been stripped over a length of 50ft. and to a depth of 5ft., and 12ft. in width of lode is exposed. The rubbly lode material has been picked from the travertine and sent to the mill. In the main open-cut stope E. of the shaft a bench in the eastern end has been removed to the level of the lowest portion of the stope, and the eastern portion of the open-cut stripped for a distance of about 30ft., and for a depth of 7ft. or 8ft. and a width of about 11ft. A sample taken across the eastern face over a width of 11ft. (with some ore still left in the wall) yielded 2dwts. per ton. A considerable quantity of broken ore is lying in the bottom of the stope.

W. of the main shaft and E. of the windlass shaft a drive has been put through a small pillar of ground. The lode between these two shafts has been taken out for a width of 12ft. W. of the windlass shaft and nearly to the western face, from 3ft. to 5ft. of the bottom have been lifted. There is no increase in the width of the stope here, and lode material is standing in the walls.

About $3\frac{1}{2}$ chains W. 20° S. from the western face of the big stope a shaft has been sunk 20ft. on veins of lode formation 8in. to 9in. thick. A grab sample from the pile of ore on the surface assayed $2\frac{1}{2}$ dwts. of gold per ton.

The mine as a whole looks better than when last seen, the width being increased by the stripping. The material stripped is, as a whole, rather low grade, but this ore is cheaply won and the size of the lode makes for cheap mining. The new 20ft. shaft may be on a new discovery, as it is slightly off the line of the main lode.

Surface Water Supply.—A 3in. pipe line has been installed from the Gap well, which so far has yielded an ample supply for the mine. The water has a tendency to corrode the pipes, some of which have already had to be repaired.

The dam sunk near the old water shaft has been fenced, and an additional excavation of considerable size has been made beside it.

Surface Equipment.—The vertical boiler at the water shaft is out of repair, and the winch has been removed to the main workings, where it is employed in hoisting ore. Steam is supplied from the battery boiler.

A level tramline has been carried from the workings to the battery on an embankment of low-grade ore won during stripping the sides of the open cuts. This ore is believed to be worth from 3dwts. to 5dwts. per ton, and is held as a reserve to be made available when conditions are better. With the water supply at present there is a sufficiency of better grade ore to be milled. Two new solution tanks have been put up, and several minor improvements made in connection with the cyanide plant and surface equipment generally. (23-6-16.)

REPORT

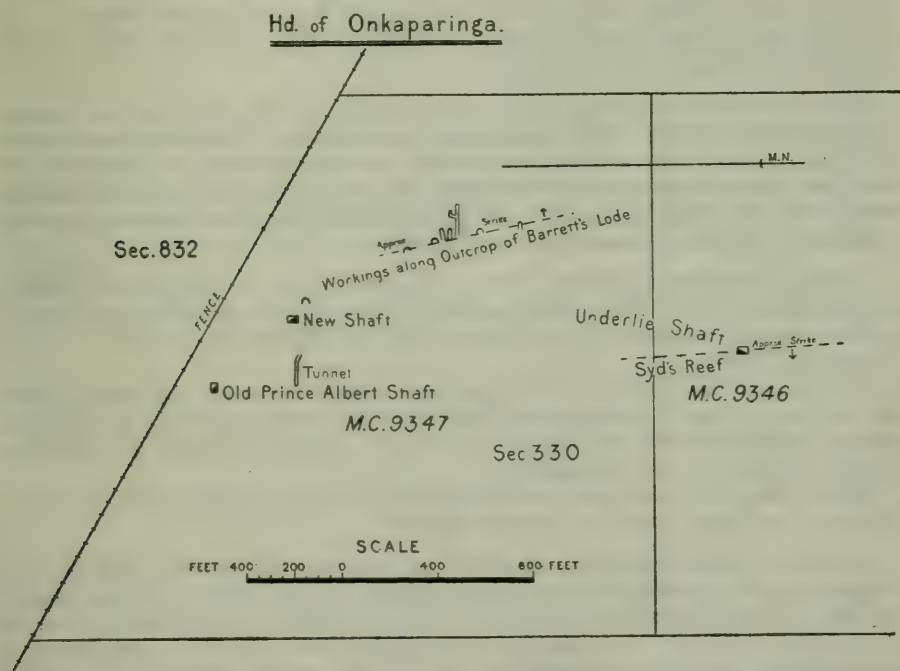
BY

The Chief Inspector of Mines (L. J. Winton, B.E.).

REPORT ON THE PRINCE ALBERT AND THE DAVID COPPERFIELD COPPER MINES.

LOCALITY—MOUNT LOFTY RANGES.

These mines adjoin each other, and are situated 14 miles by road N.E. of Adelaide, in Pinkerton's Gully, Mount Lofty Ranges, on the S. side of the Torrens River, on sections 330, 331, 332, 333, Hundred of Onkaparinga.



PRINCE ALBERT COPPER MINE.—Comprises mineral claims 9346, 9347, 10253, 10257, 10255, 10256.

CLAIM No. 9347, farthest S.—On this claim there are some old workings, some of which have been extended by the present holders, who have also opened up some fresh prospecting work. There is an old single compartment vertical shaft, 3ft. by 5ft., known as the Old Prince Albert shaft, cleaned out to 60ft., with some old workings at that level, viz., a drive E. about 65ft., and an underlie winze, but these were not inspected, there being no means of descending the shaft at the time. Some work has been done here by the present holders, but according to a previous report (Review 19, page 51), although a lode formation was present showing copper stains, nothing of any value has been met so far.

About 3 chains N. of this shaft is the entrance of a tunnel, about 60ft. in length, put in to the E. on an E. and W. lode formation, showing stains of copper carbonates and dipping to the S. The Old Prince Albert shaft was apparently sunk to intercept this lode at a depth.

About 72ft. W. of the entrance to this tunnel a shaft has been sunk and timbered to a depth of 33ft. by the present holders to cut the lode outcropping on the hill above, but has failed to do so, the position not being suitable, and work here has been stopped. Close to this and farther up the side of the hill a small cut has been opened on the outcrop of the lode, known as Barrett's lode, from which a little ore has been obtained, green and blue copper carbonates and chalcopryrite. Going N. along the line of Barrett's lode, which shows for some distance along the hill on the W. side of Pinkerton's Gully, there have been some old openings made on the outcrop, some of which have been continued by the present holders, who have also exposed the lode in some fresh places. From all these workings a little copper ore has been obtained, carbonates and chalcopryrite, which has been sorted and bagged.

One of the old workings followed the lode on the underlie to the W., dipping at about 15° , to a depth of 52ft., from which point it has been extended another 21ft. by the present holders, carrying the usual copper ores in irregular bunches. At the 52ft. mark a small stope has been worked about 18ft. in off the S. side of this underlie and about 8ft. W. on the dip.

MINERAL CLAIM No. 9346.—Adjoins 9347 on the N. The workings here are on what is termed "Syd's" Reef, outcropping approximately N. and S. along the side of a hill, on the E. side of Pinkerton's Gully. An underlie shaft has been sunk on this, but, by error, after a little distance has gone off too flat into the hanging wall. The lode dips E. at about 30° and is about 2ft. wide, showing irregular splashes of copper carbonates and chalcopryrite.

DAVID COPPERFIELD COPPER MINE.—Formerly known as Hermann's Mineral Claims (Review 19, p. 52). This property adjoins the Prince Albert on the N., and at present comprises mineral claims 10254 and 10390, both on the E. side of Pinkerton's Gully.

There are several lodes on this property, similar to those on the Prince Albert in their nature and in the nature and occurrence of the ore in them, green and blue copper carbonates and chalcopryrite occurring in irregular bunches in a siliceous gangue in which quartz predominates.

These lodes have been prospected in the past by numerous small workings, open cuts, and underlie shafts to a shallow depth.

CLAIM No. 10254.—The deepest shaft has been sunk 35ft. on the underlie of a lode dipping E. at about 40° , and a little driving has been done S. off the bottom of this. A tunnel has also been put in from the side of the hill lower down to meet these workings. At present the work being done consists in prospecting a lode thought to be a continuation of that in the underlie workings mentioned above, which outcrops along the hill a little farther S. A small open cut has been started here, and the lode shows a little green and blue carbonates and a little chalcopryrite.

On the opposite side of a small gully another underlie shaft has been sunk to a depth of about 15ft. on a similar formation also showing a little copper ore.

Here also are to be seen the outcrops of two other lodes, each showing a little copper ore where prospected.

General.—On both these properties a certain amount of ore has been obtained from the various workings, green and blue copper carbonates and chalcopryrite, which has been dressed by hand and bagged. There is, however, no well defined seam of ore, its occurrence being in irregular splashes and bunches. On the Prince

Albert the manager estimates the quantity on hand as about 12 tons, none having yet been dispatched for sale. Although of course in the prospecting stage as yet, a record of the cost of production of all ore should be kept, mining, sorting, bagging, &c.

This will serve to show whether the ore is rich and plentiful enough to show a profit on present operations, or whether its value can be only looked upon as an aid to the development of better ore by helping to defray the cost of exploration. Such method will also tend to economical working, by indicating undue costs or losses which might otherwise pass unnoticed.

Another matter which cannot be too strongly impressed upon those in charge of prospecting and exploratory work is that, in work of this nature, the rule should be to follow the values.

Where ore can be seen, or is indicated by assay, the only reasonable method of prospecting is to choose that part giving the best values or indications, and to follow these as far as possible, until either results are so discouraging as not to warrant further work or a payable body of ore is opened up, in which latter case the time is then ripe to consider the most economical method of working it. In either case, those whose money is being spent in the work can be sure that it has been used to the best advantage. For example it may be mentioned that in a case like this, in the earlier stages of development, where the lodes outcrop showing ore at the surface and can be easily prospected by following them down on the underlie, it is not wise to start any work off the lode, such as shaft-sinking, to cut the lode at depth. It is preferable to keep on the values in the lode and follow them, and later on when the course of the lode and its values have been demonstrated, the question of sinking a shaft away from it may be considered.

In conclusion it may be said that those properties offer a favorable field for prospecting, the lode formations carrying copper ore being of fair size, and their proximity to Adelaide would be of material assistance in lessening the cost of working. (29-6-16.)

REPORTS

BY

The Inspector of Mines (Mr. Henry Jones).

LOCALITY—MOUNT LOFTY RANGES.

THE PRINCE ALBERT COPPER MINE (*vide* Reviews Nos. 19 and 23).—On section 332, hundred of Onkaparinga.

Since last visit a large amount of prospecting has been done.

On the W. side of the gully near the foot of the hill an open cut has been carried in W. for 24ft. by 8ft., disclosing a ferruginous quartz lode containing small patches of copper carbonates. It is of low grade, but well defined, from 3ft. 6in. to 4ft. wide, and may contain better values at depth. Sinking in the lode channel would further prove it.

About 300ft. up the hill an adit is in N.W. 19ft., and a drive extended W. 21ft. in a lode formation of ferruginous quartz 2ft. wide, impregnated in places with high-grade copper carbonates, chiefly azurite and malachite with pyrites. This appears worth further testing.

At the 70ft. level in the gully shaft 18ft. has been sunk on the underlie of the formation, but owing to impure air the workings could not be examined.

Syd's underlie shaft has been sunk in the lode to 25ft., where the country is disturbed and the lode splits into several leaders, one of which has been followed by a drive in the hanging wall for a distance of 18ft. A little copper ore was seen in the matrix, chiefly quartz from 6in. to 12in. wide, but at the face the quartz has disappeared. In the shaft prior to intersecting the fault the lode was of quartz 2ft. wide, carrying patches of fairly high-grade copper ore, and to further prove it the shaft should be put in proper order and sunk down on the dip through the disturbed zone for a reasonable depth in the settled country, then crosscuts can be extended both ways to locate the ore channel.

Seven samples gave the following results:—

- No. 1.—From foot of hill, open cut, lode 4ft., copper nil.
- No. 2.—From foot of hill, hole 5ft. deep, lode 2ft., copper nil.
- No. 3.—From drive W. top of hill, lode 2ft. 6in., copper trace.
- No. 4.—From drive W. 20ft. in, lode 2ft. 6in., 0·7 per cent. copper.
- No. 5.—From lode material on surface, gully shaft, copper nil.
- No. 6.—Syd's shaft, surface dump, 2·2 per cent. copper.
- No. 7.—Syd's shaft, surface, best ore $\frac{1}{2}$ ton dump, 11·3 per cent. copper.

(10–1–16).

Further report (13–4–16).—The principal work carried on has been further testing the various reefs at shallow depths.

A short distance N. from the main gully shaft an open cut has been carried in N. on the side of the hill for a distance of 20ft. by 10ft. wide. A well-defined ferruginous quartz lode 4ft. wide is exposed here, striking at this point nearly E. and W. and dipping S. The quartz in places contains small specks of rich copper ore. About 50ft. S. from the mouth of the cutting, at the foot of the hill, a vertical shaft has recently been sunk 30ft. from the brace, chiefly through bedded country rock, probably the footwall of the reef showing in the cutting. Nothing of value being discovered, sinking for the present is discontinued. Near the top of the hill, about 300ft. above the gully, a large open cut in the outcrop of Barrett's lode is now in progress. The formation disclosed here consists of ferruginous quartz,

2ft. to 2ft. 6in. wide, carrying rich patches and small seams of fairly rich copper ore, chiefly azurite and malachite. A sample from the lode in the face for 2ft. wide gave 4.1 per cent. and a sample from the rich seam gave 22.1 per cent. copper. As at present shown in these workings, and at different points along the line of strike in the various shallow pits, this formation appears fairly extensive and likely to contain rich pockets of copper ore.

Syd's Reef.—The underlie shaft in this formation proved the country to be very much disturbed and the lode broken up into small leaders from the 20ft. level downward, and the work done shows that the displacement in the ore channel is extensive.

Above the disturbed belt of country Syd's reef appears of a very promising nature, average 2ft. wide of ferruginous quartz impregnated with copper carbonates. To further prove this lode a drive in the ore channel should be started at the 20ft. level and carried in N. under the hill. This work would explore a very large portion of the holding and make available a considerable length of new ground along the line of lode for stopping. A sample taken of the lode matrix obtained from above the 20ft. level in sinking gave 4.8 per cent. copper.

CAHILL BROS. GOLD MINE (HIDDEN SECRET, *vide* Review No. 22).—On section No. 1, hundred of Talunga.

A considerable amount of prospecting by shallow pits and open trenching was done some years ago; most of the pits have fallen in.

An underlie shaft was recently sunk 40ft. and has been connected by a vertical shaft sunk to a depth of 30ft. From the bottom of the vertical, driving in the formation has been done for a length of 20ft. and the block of ground stoped out to near the surface in places. The whole material exposed consists of soft ferruginous kaolin. Four samples taken along one side of the block worked out gave the following results:—

No. 1, gold trace; No. 2, 1dwt. gold per ton; Nos. 3 and 4, nil, showing that the occurrence of gold is patchy and probably in narrow shoots, as the portion of the ground already worked gave fairly high returns. One parcel of 20½ tons treated at Mount Torrens Battery gave 2½ozs. of gold per ton. Second parcel of 18½ tons, 4½ozs. gold per ton. Further sinking should be carried down on the dip of this run of ore. (14–1–16.)

THE BLUMBERG GOLD MINE (*vide* Record, page 270, and Review No. 16).—Situated on section 6396, hundred of Talunga.

A large amount of mining has been done in the past at different places on this section, but the greater number of the holes and pits are full of mullock. Work is now once more in progress, and on gradually rising ground an underlie shaft has been sunk to a depth of 49ft. This has been connected with a new vertical shaft recently sunk to a depth of 28ft., thus making the ventilation good in both workings.

On each side of the underlie from bottom to surface ore has been stoped. The vein is well defined, striking N.W., dipping N.E., and consisting mainly of kaolin and brown iron ore 9in. to 12in. wide, carrying gold. The first parcel of 10 tons, treated at the Mount Torrens Cyanide Works, returned 17dwts., and the second, 20 tons 10½dwts. of gold per ton. Neither of these parcels were sorted ore.

At a depth of 30ft. in the underlie shaft there is strong evidence of an ore body traversing the footwall in a N. and S. direction, crossing the vein now worked diagonally. It appears a fairly strong formation 18in. to 24in. wide; a winze sunk in this body will be the best mode of testing it down from the present level.

W. from the present workings three prospecting shafts have been sunk to depths of 17ft., 27ft., and 30ft. respectively, and driving done at the different levels intersected several small veins 2in. wide carrying a little gold, but not payable.

At one point on the block work has been done in the past for a length of 100ft. by 40ft. deep, in places, in a barytes lode, 3ft. to 4ft. wide. As the workings have fallen in, this formation could not be examined, but the material showing on surface in the dumps appeared good.

Work in a kaolin formation has been carried on at one time by an open cut 40ft. long by 30ft. wide, with a face 10ft. to 15ft. high; the deposit appears extensive and of great thickness. Four samples of the lode from the underlie shaft gave on assay—

No. 1.—From 25ft. level, new lode, 2ft., nil.

No. 2.—From 30ft. level, new lode, 3dwts. gold per ton.

No. 3.—From vein 9in., now worked, at 40ft. level, 14dwts gold per ton.

No. 4.—From vein 12in., now worked, at 35ft. level, 7dwts. gold per ton.

(14-1-16.)

MOUNT MALVERN SILVER-LEAD MINE (*vide* Record, page 183, and Reviews Nos. 8-10, 19-23).

The large concentrating plant recently obtained from Paull's Consolidated Mine, comprising a May's double jig with eight plungers, stone breaker, Cornish rolls, belts, pulleys, shaftings with heavy gearings, and a large horizontal steam engine have now all been removed to this mine, and the preparatory work necessary prior to the erection of a plant is now in hand and good progress has been made.

A large excavation 44ft. wide by 56ft. long into the hill, with a face 17ft. high, has been taken out for foundations for jiggers and concentrating tables, and the largest portion of the high masonry walls round two sides and the end of this cutting, and the cement concrete block foundations for 12in. x 12in. wood pillars to carry this section of the plant are near completion.

The excavations and foundations for rock breaker and rolls 25ft. by 27ft. are being completed, and the thick masonry walls 3ft. and 5ft. wide by 6ft. high, with strong holding-down bolts built in, and concrete beds are finished. The necessary timber 27ft. to 32ft. long and 12in. square for this section to carry the heaviest portions of the machinery is not yet to hand.

A portion of the ore dump will be cleared away for the excavation of a foundation for the heavy horizontal engine to drive the whole of the treatment plant.

The constructions are being carefully arranged so as to enable the greater portion of the ore to pass through the various processes with little or no handling. (2-2-16.)

The erection of the plant capable of treating 100 tons of ore a day has been completed and a satisfactory trial run made. The main shaft has been overhauled, and all appliances in connection with it put in proper order. (12-6-16.)

THE STIRLING REEF MINE (*vide* Record, page 235).—Situated about 2 miles S. from Mylor.

The old workings are on rising ground 100ft. above the gullies, and consist of a large open-cut and a vertical shaft sunk to a depth of 85ft., with several prospecting shafts sunk at different points to shallow depths.

The open cut traverse the ridge in a N. and S. direction for a length of fully 300ft. by 12ft. to 18ft. deep and 14ft. wide. Owing to the great length of time since this work was done the sides of the opening have fallen in, covering the bottom from end to end with mullock, and until this has been removed, or trenched through in places, it will be impossible to give an opinion or to ascertain with any degree of accuracy the nature, size, and true value of the material along the bottom. Judging by the large amount of work done, and the quantity of tailings deposited at the old battery site near the southern end of the workings, it would appear that the material from these open workings contained a fair percentage of gold. At a point near the northern end of the open cut a vertical shaft has been carried down to a depth of 85ft., thence a drive extended N.W. for a total distance of 70ft. The material exposed consists mainly of country rock, with an irregular seam of soft ferruginous

clay-slate, quartz, and ironstone varying in width from 6in. to 18in. Of 11 samples of the seam from different points in the drive eight proved nil, two gave a trace of gold, and one from near the shaft gave 1dwts. of gold per ton, showing that the vein is of little value at the present level.

Along the eastern side of the open cut at different points for a length of 300ft. 11 samples were taken. Nine gave trace of gold, one nil, and one from a small vein 3in. wide near the centre of the workings gave 7dwts. of gold per ton. These last 11 samples were taken so as to prove the values of the offshoots or leaders traversing the apparent hanging wall of the main ore channel.

Considering the great length and width of the gold-bearing country disclosed in these old workings for the 20ft. followed down, and that there are fair indications of persistence in depth, the prospects appear to justify more prospecting work being done at different points in the cutting to prove the property at greater depth. (7-2-16.)

THE DAVID COPPERFIELD COPPER MINE.—Situated N. of and adjoining the Prince Albert, on section 332, hundred of Onkaparinga.

A little prospecting was done many years ago, principally confined to small openings, one underlie shaft 35ft. deep and a small tunnel into the hill intersecting the lode at a depth of 30ft. vertical, and thence connected with the surface by an air shaft. In the face of the tunnel a well-defined break or fault in the country is exposed, crossing the lode at right angles, and appears at this point to have displaced the ore channel 20ft. Some driving has been done in the S. branch of the lode, but being full of mullock could not be examined. On the northern branch of the lode a drive has been extended N. 36ft. through to the underlie shaft. The ore bearing matrix disclosed here consists mainly of schist and ferruginous quartz veins from 2ft. to 3ft. wide, carrying specks and thin seams of copper ore on the N. side of the shaft at the 35ft. level, and some nice bunches of grey ore can be seen in the formation. This old underlie shaft could be put in good order at a small cost for further working and testing the lode at greater depth, and also along the line by driving in the ore channel.

Several lode formations appear to traverse the blocks, as in a number of the old shallow pits put down on different parts of the holding ore-bearing material of promising nature is exposed.

A small syndicate acquired the mining rights of this property recently, and is now doing further prospecting work in some of the old workings and other places. At one point on the side of the hill an underlie shaft is down 12ft. showing ore-bearing material consisting of slate and quartz veins containing copper incrustation in the joints and bedding for a width of over 6ft. with no footwall at present. About 2 tons of fairly high-grade ore were extracted from these workings during the last two weeks. To further test this promising formation sinking on the angle of dip near the footwall would be the best mode and crosscut through the lode at different levels to prove width and value. A sample taken from the face of the underlie gave 4.8 per cent. copper.

At a point 24ft. N. from the old underlie shaft an opening has been carried down from the outcrop to a depth of 20ft. The formation disclosed here is chiefly slate, with quartz veins containing patches and thin seams of copper carbonates. A sample taken from the several veins showing gave 10.7 per cent. copper. The development so far on this property is encouraging, and tends to show that the various lodes are worth testing at greater depth. (13-4-16.)

LOCALITY—SOUTH.

THE ECLIPSE OCHRE MINE.—Situated on the sea coast about four miles S. of Port Noarlunga.

Area 23 acres, the greater portion being on a fairly level plateau about 50ft. above high-water mark, and along the western sea frontage a belt of sloping ground, from 15 chains to 20 chains wide, runs from the top to the beach. The rocks exposed

are variegated slates, striking nearly E. and W. with a slight dip to the S. A belt about 200ft. wide of chocolate, white, and yellow clay shows on the sloping ground, and runs E. and W. for about 10 chains, with a probable average depth of about 40ft. This deposit, as shown by the analyses attached, is very suitable for the making of colored tiles, and about 1,000 tons have already been used for that purpose in Mr. Trewenack's Works at Magill, with very satisfactory results, the article produced being considered quite equal to the imported tile. The deposit could be readily worked on a large scale on the open cut system at small expense.

On the property also exist the outcrops of several beds of friable white sandstone, which when mixed with the clay may prove suitable for the manufacture of fire-bricks.

Samples of clay from this property forwarded by Mr. Trewenack to the Department of Mines were investigated by the departmental analyst, with the following results:—

Clay Sample.

	No. 1.	No. 2.	No. 3.
Silica	60.52	63.70	52.52
Alumina	18.66	19.68	30.77
Ferric oxide	8.31	4.46	1.94
Magnesia	1.10	0.86	0.24
Lime	Nil	0.23	Nil
Soda.....	0.38	0.68	0.32
Potash	4.99	3.91	3.06
Water at 100° C.	0.84	0.85	0.89
Water over 100° C.	3.93	4.74	8.41
Carbon dioxide.....	Nil	Nil	Nil
Titanic dioxide.....	0.90	1.01	1.67
Chlorine.....	0.12	0.21	0.23
	99.75	100.33	100.05
Total fluxes	14.78	10.14	5.56

Color.

	No. 1.	No. 2.	No. 3.
Unburned	Red	Light yellow	White
Burned at 1,000° C., oxidising atmosphere.	Red	Light red	White
Burned at 1,450° C., reducing atmosphere.	Blackish	Yellowish brown	Grey
Fusibility test at 1,450° C.....	Fused to slag	Fused	Edges fused
Refractory or non-refractory	Non-refractory	Non-refractory	Non-refractory

LOCALITY—NORTH.

THE LAST RESOURCE.—A copper show situated about half a mile N.E. of the Mount Coffin Mine.

An open cut 20ft. by 10ft. and from 12ft. to 15ft. deep was made some years ago in an ill-defined formation carrying small veins of copper ore, and it is said that a parcel of fairly high-grade ore was obtained.

The ground has recently been taken up again. (5-5-16.)

DIAMOND JUBILEE COPPER MINE (*vide* Record page 49, and Reviews Nos. 9, 13, 19, and 22).

In the winze from the E. drive off the tunnel a drive has been put in E. for 20ft. in a strong ore channel from 3ft. to 6ft. wide, consisting mainly of ferruginous quartz containing malachite, ruby oxide, and grey ore. A sample taken from 2ft. in the face of the drive gave 23.2 per cent. copper.

W. from the water shaft some ore has been stoped out in another ore channel at shallow depth in Nos. 1 and 2 shafts. The lode matrix is mainly ferricalcite 16in. to 20in. thick, and probably contains rich shoots of ore. The last parcel sent from the mine gave 22 per cent. copper. The property seems worth developing on a larger scale. (5-5-16.)

WILD DOG (*vide* Reviews Nos. 9, 10, 13 and 16)—Three miles S.E. from Leigh Creek.

An old copper show, upon which little work has been done for some time. Some prospecting is now in progress N.E. of the old workings along the line of strike, and so far results are encouraging. (6-5-16.)

MOUNT COFFIN (*vide* Record page 87, and Reviews Nos. 9, 13, 16, and 22).—About nine miles N.E. from Leigh Creek.

A new underlie shaft near the western boundary has been sunk to 60ft., and at the 22ft. level driving W. is in progress, now 64ft. in. The lode formation is 2ft. wide, with 3in. to 5in. seams of fairly high-grade ore on the hanging wall. Five tons of ore recently sent away returned 14½ per cent. copper. (6-5-16.)

NICHOLS' NOB COPPER MINE (*vide* Record, page 49, and Reviews Nos. 9, 13, 19, and 22).

The new underlie shaft S.E. from the old workings has been sunk from 80ft. to 96ft. A fair supply of good water was struck at 90ft. 6in. At the 90ft. level the crosscut S.W. is in 34ft., and at 26ft. a 3in. to 4in. vein of ferruginous quartz carrying gold and copper was passed through. Samples from this gave on assay 19.9 per cent. copper and 3½dwts. gold per ton. The crosscut N.E. is in 40ft., but nothing of value has been struck. Samples from veins near the bottom of the shaft gave from 12 per cent. to 20.5 per cent. copper and traces of gold. At the 76ft. level a drive S.W. on the course of the lode is in 16ft., the formation being ferricalcite, 4in. to 8in. thick, carrying patches and pockets of fairly high-grade ore. The opposite drive N.W. is in 34ft., the formation, from 6in. to 10in. wide, carries copper and gold, samples giving 7.2 per cent. to 13.5 per cent. copper and 1dwt. to 2dwts. gold per ton. (10-8-16).

PAULL'S CONSOLIDATED COPPER MINE (*vide* Record, page 116, and Reviews Nos. 9, 13, 17, 19, 20, and 22).

A little work has been done in an open cut 18ft. N. and S. and from 6ft. to 12ft. deep W. of and near Paull's old prospecting shaft, showing a formation from 4ft. to 5ft. thick of ferruginous slate containing seams of malachite, grey ore, and copper vanadate crossing the main lode N. and S. How far this run of ore will extend can only be determined by following on the open workings, as there is no surface

outcrop. Sixteen tons of ore, partly from this place, have been recently marketed with satisfactory results. A sample from across the N. end of the cutting for 6ft. assayed 8.8 per cent. copper, and a sample from a 6in. vein gave 27.9 per cent. (11-5-16.)

THE FLINDERS (YUDNAMUTANA) COPPER MINE (*vide* Record page 157, Reviews Nos. 9, 12, 14, 17, 18, 19, 21, 22, and Geological Survey Report, No. 3).

The results obtained from the recently erected experimental plant for treating the low grade copper ores are considered satisfactory by the company's officials, and the installation of a plant able to treat 100 tons a day is contemplated.

The water shaft at the foot of the Daly Hill is down 100ft., water was struck at 23ft. and is now making 400galls. an hour. A crosscut from the 94ft. level, now in 57ft., is being driven N.E. to cut and test the Daly lode and also provide storage for water. (15-5-16.)

BILLY SPRINGS (MOUNT FITTON) MINE (*vide* Record, page 89, and Review No. 9).

A fairly large amount of mining has been done at one time by shafts and open cuts. The main shaft 6ft. by 4ft. in the clear, strongly timbered, is down a total depth of 100ft. and work appears to have been done in the ore body at the 43ft. level. No rope for descending this shaft, owing to non-delivery of order, was available, and I was therefore unable to examine the ore channel in the lower workings.

At a point 50ft. N.W. from the main shaft, No. 2 shaft has been sunk in the formation to a depth of 18ft. Further N.W. 66ft., No. 3 shaft in the lode is down 16ft., work is now in progress taking out ore between these shafts by an open cut in which is exposed for a length of 70ft. an ore channel. Strike N. 65° W. with a steep dip N.E., consisting of ferruginous arenaceous sandstone and slate intermixed with limestone, 8ft. to 10ft. wide, carrying smithsonite, copper glance, malachite, and cerussite.

From the bottom of No. 2 a drive has been extended N. 65° W. in the ore channel up to No. 3 shaft. The formation along this drive shows a width of from 8ft. to 12ft. with no defined walls; the lode matrix here is of similar nature to that in the open cut above, with the exception that the iron oxide occurs in larger patches extending for several feet across and parallel to the ore channel in places. At one point in the drive between the two shafts, a small break or fault in the country has occurred, displacing the ore channel slightly to the N.E., and the ore-bearing material shows much greater in width than in other parts of the workings.

From the end of the main shaft an open cut 10ft. deep and 30ft. long S.E. has been made in the course of the ore channel, and it appears that a fair amount of lode stuff was extracted from here for a width of 6ft., but as this working is now partly filled up with mullock, it was not possible to determine the true width and value of the lode in the bottom; the S.E. face of the cutting above the loose mullock was in soft decomposed material showing copper stains in places.

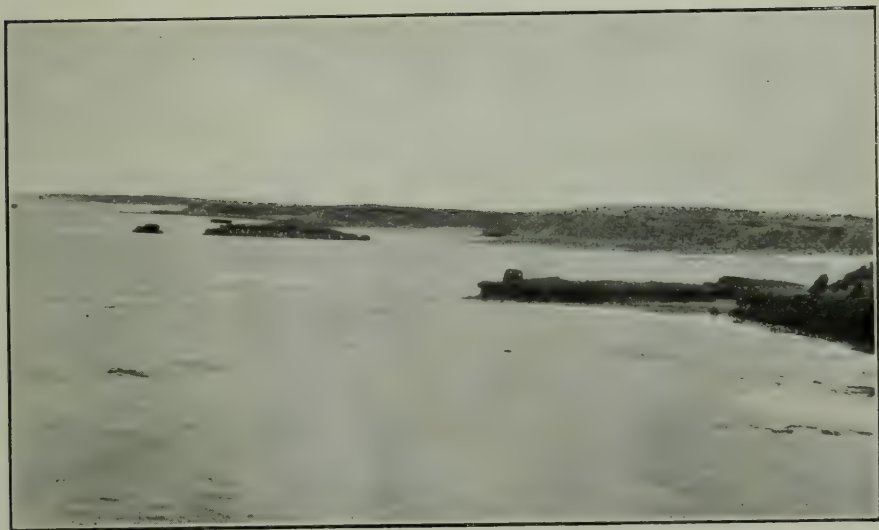
The formation as shown in the present shallow workings for a length of 70ft., appears of a promising nature and likely to yield large quantities of good ore, but owing to its complex nature it is a very difficult matter to dress the ore to one particular kind, and the owner of the mine has considerable trouble in finding a market for the mineral product in its present combined state.

There are now several dumps of different grade ore stacked at surface, totalling about 100 tons, recently extracted from the present open cuts. A trial parcel of 5 tons of copper ore has been bagged and will be forwarded to Port Kembla for treatment.

Water for domestic use has at present to be carted some distance, and the claim-holder has done a considerable amount of work in sinking and otherwise making provision for the storage of storm water.



Limestone Quarry on the Western Coast of Wardang Island.



The Western Coast of Wardang Island, North of the Limestone Quarry.
Face page 54.]

Fourteen samples taken from different parts of the workings, and dumps on surface at the time of my inspection, gave the following results:—

No. of Samples.	Locality.	Description.	Gold per Ton.	Silver per Ton.		Copper.	Lead.	Zinc.
				ozs.	dwts.			
1	Face S.W. drive for 4ft.	Smithsonite and copper stains	Nil	2	4	1.0	Nil	17.4
2	Bottom shaft 18 feet, for 6ft.	Smithsonite, cerussite, copper stains	"	3	6	1.8	2.2	35.5
3	Bottom shaft 18 feet, for 4ft.	" " "	"	6	2	1.4	11.6	35.7
4	Bottom shaft 18 feet, for 8ft.	" " "	"	18	18	1.2	14.4	22.7
5	Bottom shaft 18 feet, for 3ft.	" " "	"	19	10	3.1	49.2	3.1
6	Little from different dumps	" " "	"	4	10	2.0	1.4	39.1
7	Ore bagged	Smithsonite, cerussite, copper glance	Trace	25	12	24.1	Nil	23.6
8	Second class ore.	" " "	"	4	12	6.7	1.8	38.3
9	Large stack crude ore	Smithsonite, cerussite, and malachite	Nil	6	12	4.2	2.8	41.2
10	Across open cut for 8ft.	Smithsonite, cerussite, and copper glance	"	20	16	6.8	14.8	28.8
11	Dump 20 tons crude ore	Smithsonite, cerussite, and copper stains	"	2	10	1.0	1.0	42.1
12	Two tons of ore bagged	Smithsonite, cerussite, and copper glance	"	19	0	6.1	22.1	27.1
13	Dump 12 tons crude ore	" " "	"	11	4	6.3	1.7	39.3
14	Quantity crude ore	Smithsonite, cerussite, malachite	"	15	12	8.0	20.7	25.8

(17-5-16.)

THE COPPER QUEEN (BELTANA RAPID ORE TREATMENT SYNDICATE), *vide* Reviews Nos. 9, 10, 14, 15, 16, 18, 19, and 22.

The principal work carried on for the last few months has been prospecting, and a number of bore holes have been put down.

No. 1.—From bottom of main shaft, 82ft. deep, 50ft., making total depth from surface, 132ft. A few specks of copper carbonates were seen in the borings, but no formation was struck.

No. 2.—50ft. E. from main shaft—73ft. Carried down to the S. drive from the winze in the main shaft, and will be of some help in ventilation.

No. 3.—100ft. S. from No. 2—65ft. Ore-bearing material was passed through from 19ft. to 44ft., showing, apparently, a new formation underlying the ore worked on from the shaft.

No. 4.—50ft. farther S.—25ft. The last 4ft. being in the ore body as above.

No. 5.—50ft. E. from No. 4—45ft. Ore-bearing material struck at 22ft. and continued to bottom.

No. 6.—100ft. S. from No. 4—60ft. A little ore was seen in the borings; the drill, when below water level, was colored with copper.

No. 7.—138ft. N.E. from No. 5—14ft. The ground was soft and broken, and boring could not be continued without casing.

No. 8.—130ft. S.E. from No. 5—80ft. Ore-bearing formation from 38ft. to 48ft.; remaining 32ft. in country rock.

No. 9.—111ft. S.E. from No. 8—83ft. Nothing of value struck.

Water lever over the area is about 55ft. from surface.

A new vertical shaft has been started between Nos. 3 and 4 bore holes.

The treatment plant is under repair. (25-5-16.)

WALKER'S SILVER-LEAD SHOW.—Situated section No. 47, Hundred of Bendleby. Hills 200ft. to 300ft. high traverse the blocks. The country rocks, consisting mainly of clay slates, show on the surface, strike E. and W., dip nearly vertical. At different points along the comb of these bedded slates the outcrops of a number of small seams, varying from 3in. to 6in. wide, of metal-bearing material are showing running parallel with the strike of the slate, but cutting through it at a flat angle to the S.

On the eastern slope of a hill some prospecting has been done N. and S. for a distance of 10ft. by 3ft. deep. In these workings three veins 4in. to 5in. wide, mainly of calcite with small specks of malachite, are exposed. They are well defined, but are not likely to make wider at depth, and the values are very low.

Samples taken from each vein gave the following results:—

No. 1.—Vein 4in., 0.6 per cent. copper, silver and lead nil.

No. 2.— “ 4in., 0.2 per cent. copper, silver and lead nil.

No. 3.— “ 5in., 0.1 per cent. copper, silver and lead trace.

About 2 chains N.E. from the last workings No. 4 seam, 2in. wide outcrops; this consists of ferruginous calcite carrying little specks of copper. Sample taken from different parts gave 0.5 per cent. copper, silver and lead nil.

Farther W., on the slope of another hill, No. 5 seam is exposed in a hole 6in. deep. This is 3in. wide of calcite carrying little malachite. Sample taken gave 0.3 per cent. copper, silver and lead nil.

A short distance S.W. from the last, two small seams of calcite outcrop varying from 2in. to 4in. wide. Sample taken gave 0.7 per cent. copper, silver and lead nil.

So far nothing of a payable nature has been disclosed, and the prospects as shown at present are very discouraging, but it is quite possible that by further systematic prospecting on the various hills formations of better size and value may be revealed. (27-5-16.)

F. ARTHUR'S COPPER CLAIM.—Situated Hundred of Oladdie, 4 miles W. from Johnburgh, and about 20 miles N. from Orrorio.

The workings on the block were done many years ago. An underlie shaft has been sunk to a depth of 30ft. For 20ft. down the quartzite is impregnated with small seams and stains of copper carbonates for a width of 5ft., and some of the veins are of fairly high grade, as shown by two samples taken at the 20ft. level—No. 1, from a vein 3in. wide, gave 7.3 per cent. copper; No. 2, from a bunch of ore on S. side of shaft, gave 17.1 per cent. copper. The country is of a very hard nature, and the prospects of the ore paying for working, as shown at present, are not very promising. In the bottom of the shaft a drive, in hard quartzite, has been extended N.W. 10ft. The veins of ore exposed up the shaft do not appear to continue down to this level.

About 90ft. W. from the underlie a large amount of work has been done by trenching and sinking. One vertical shaft is down a total depth of 35ft., but it does not appear that any copper-bearing material has been discovered in any of these workings.

The prospects so far on this part of the block are rather discouraging, but probably by further systematic prospecting in the vicinity and other parts of the holding a more defined ore channel may be discovered. (27-5-16.)

T. ARTHUR'S COPPER CLAIM.—Hundred of Oladdie, 5 miles W. from Johnburgh.

The old workings on the block, done many years ago, are situated on rising ground, about 50ft. above the adjacent gully, and consist of open cuts and one shallow vertical shaft.

No. 1 open cut is 20ft. long by 3ft. to 4ft. deep; in this is disclosed a small vein 2in. to 3in. wide of high-grade copper ore, strike N.E. and S.W., dip S.E. 45°. The vein, consisting of ferruginous calcite carrying copper pyrites, is well defined with two good walls. Sample taken from the lowest part of the cutting gave 15.6 per

cent. copper, silver and lead nil. This vein may improve in width at greater depth. Farther N.E. 40ft., No. 2 cutting is 8ft. long and 3ft. deep. The same vein of ore is exposed here, but at this point contains more iron and is of larger size—3in. to 6in. wide. Sample of the vein from different parts of the hole gave 3.8 per cent. copper.

A short distance to the S.E. of the open cut workings, on the dip of the vein, a vertical shaft has been carried down to a depth of 10ft., with a view apparently of intersecting the ore channel operated on in the cutting at greater depth. Judging by the dip of the vein this shaft is not deep enough to cut the ore. Further sinking in the vein from the open cut may reveal a wider ore channel. (27-5-16.)

LOCALITY—NORTH-EAST.

THE OODLAWIRRA (MALTESE CROSS) OCHRE MINE (*vide* Reviews Nos. 8, 9, 11, 14, 17, 19, and 22).

Work in the iron oxide deposit has been resumed. The old workings comprise several shafts and surface openings carried down to various depths of from 30ft. to 100ft. The occurrence of ochre as proved in the numerous drives carried in at different levels is erratic, consisting of small veins and pockets widely apart, necessitating work in barren country to disclose the different deposits.

No. 1 shaft and the workings at the 40ft. level have been overhauled and made safe, and extending the N.E. drive is now in progress. The vein of ochre exposed is from 9in. to 30in. wide, of fairly good material. (25-1-16.)

Stoping is in progress at the 20ft. level between the N. and S. shafts, and about 40 tons of ochre obtained so far. (22-6-16.)

THE GOLDEN JUNCTION GOLD MINE (*vide* Record, page 219, Reviews Nos. 19-23, and Geological Survey Report No. 2).—Near Mount Grainger.

The main vertical shaft sunk by previous company to a depth of 151ft. has now been carried down a further depth of 100ft., making a total depth of 251ft. from surface. At 243ft. the water zone was intersected, and for the last 4ft. the water is making stronger, and there is every probability that by further sinking 15ft. to 20ft. the necessary quantity of water to supply a large treatment plant will be obtained.

The shaft is being equipped with horse whip and substantial staging and ladders from surface to bottom. (25-1-16.)

The main shaft has been enlarged and carried down to 259ft. from surface. Water of good quality was making strongly in the last few feet of sinking, and now stands at the water level, 243ft. (22-6-16.)

THE MYRTLE (DUSTHOLES) GOLD MINE (*vide* Record, page 214, and Reviews Nos. 8, 13, 14, 15, 16, 17, 21, 22, 23, and Geological Survey Report No. 2).—Two miles W. from Mount Grainger.

At the 137ft. level, in the water shaft, the western crosscut has been extended a further distance of 30ft., total 60ft. from the shaft, and at 45ft. in, the lode formation passed through in the shaft was intersected, consisting of bedded quartzite and slate, with small quartz seams and iron veins for a length of 15ft. In the face of the drive a bore hole has been put down 17ft. The borings from this are said to give fair prospects of gold.

On the surface near the shaft a fair amount of open cutting has recently been done. The S. opening is 20ft. wide, and is now in 40ft. with a face 12ft. to 14ft. high. The N. open cut opposite is 8ft. wide, and has been carried in a total distance of 50ft. The formation exposed in both these workings consists mainly of layers of quartzite, clay-slate, and argillaceous sandstone, with numerous quartz and iron seams lin. to 12in. wide carrying a little gold.

Three parcels totalling 50 tons of ore recently extracted from these workings treated at the Government cyanide works, Petersburg, yielded 2dwts. 23grs. gold per ton

off the plates, the tailings from one parcel, $18\frac{1}{2}$ tons, produced 1oz. 6dwts. 5grs. by cyanide; the tailings from the other parcels were not worth further treatment. (25-1-16.)

THE NEW MILO GOLD MINE, Wadnaminga (*vide* Record, page 322, and Reviews Nos. 10, 11, 14, 15, 18-22).

In the main underlie shaft at the 370ft. level stoping is in progress off the W. drive; the ore body disclosed is well defined, and consists mainly of ferruginous quartz and pyrites, 20in. to 24in. wide, carrying gold. The lode in this part of the mine has been proved and worked for over 200ft. W., and it appears fairly strong, with every prospect of persistence in strike and depth. The last parcel of 17 tons gave at the Government cyanide works, Petersburg, 13dwts. of gold per ton. Four samples taken from different points in the present stope gave the following results:—

No. 1. S. end, lode 15in., 2ozs. 2dwts. gold, and 18dwts. silver.

No. 2. S.W. end of stope, lode 24in., 12dwts. gold and 6dwts. silver.

No. 3. S.W. end of stope, lode 24in., 1oz. 1dw. gold, and 7dwts. silver.

No 4. From N. end of stope, lode 15in., 2ozs. 4dwts. gold and 14dwts. silver. (23-2-16.)

THE GREAT EASTERN GOLD MINE (*vide* Record, page 322, and Reviews Nos. 15, 20, 21, and 22).—Situated at Wadnaminga.

A 10-head battery with amalgamating tables driven by a 32h.p. suction gas engine has been recently erected, and is now treating ore from the mine. The sands and slimes are conveyed down the hill to the cyanide plant and all sections of the plant are planned to, when completed, treat the ore with as little handling as possible.

Mining is carried on in No. 3 underlie shaft from which 100ft. of tram line on trestles has been erected to the battery and a tram line down the shaft to a depth of 70ft. Further sinking in this shaft is now in progress, and a start has been made to drive E. and W. in the ore channel at the 70ft. level. The seam of ore exposed consists of ferruginous quartz 6in. to 12in. wide, carrying a little pyrites and gold. Sample taken from a vein 6in. near the roof gave 1dw. gold per ton, one sample from the W. corner of the underlie gave no value. There is evidence in these workings that the shaft has passed through the shoot of ore operated on in the higher level, but as there are other shoots showing in the old eastern workings apparently trending westward, it is quite possible that by further sinking No. 3 shaft, which is most convenient to the battery, higher value ore will be intersected.

At points E. along the outcrop, 140ft. and 260ft. from the present workings, two underlie shafts sunk by a previous company are down 65ft. and 180ft. respectively, and from each, in the past, a large amount of driving and stoping in the ore channel has been done, indicating that the large quantity of lode material extracted carried a fair amount of gold.

On the eastern blocks of this company, adjoining the western boundary of the Thunder Queen, prospecting is in progress with a view to locate the continuation W. of the Thunder Queen ore channel. One shaft has been sunk 20ft. vertical and 35ft. on the underlie of a seam 12in. to 24in. wide of ferruginous material which contained no values at that depth. Several other prospecting shafts have been sunk to depths of from 8ft. to 12ft.

Farther to the S. of the dip of the lode a new vertical shaft has been started and is now down 10ft. Sample taken from the bottom carried no values, but sinking here should be continued as the indications show that the ore channel is likely to extend in this direction. (23-2-16.)

No. 3 underlie shaft has been sunk to 95ft., driven on E. and W., and the ore obtained treated by the plant on the mine. Prospecting in the block adjoining the Thunder Queen has so far not been successful. Suggestions as to future prospecting are made. (23-6-16.)

THE THUNDER QUEEN (*vide* Reviews Nos. 21 and 22).—The eastern block of the Virginia property, Wadnaminga.

Vigorous developmental work is in progress. Two underlie shafts started in the outcrop of the formation close to one another diverge as they go down; the pillar between is driven through at different points for ventilation. The shafts are now down each to a depth of 110ft., and a drive in the formation at the bottom 80ft. long connects the two workings; E. of No. 1 shaft a drive is in 30ft. and W. from No. 2 25ft, thus making total length driven in the ore channel 135ft. The level has been properly timbered and stoping at the back is now in progress, the ore body in all the workings appears very consistent with fairly defined walls, and consists of ferruginous quartz, ironstone, and iron pyrites, 18in. to 20in. wide, carrying gold and bunches and veins of galena in places. About 150 tons of ore per month are extracted, yielding on an average by battery and cyanide, 15dwts. of gold per ton.

The system adopted to work and develop this new property is highly commendable and is well worth adopting in prospecting new ore channels, as it affords every facility for proving the lode to a great depth. The shafts are equipped with 6½h.p. oil engine, friction gear drum, and winding rope, small poppet heads, with adjustable moving pulleys erected at a point on surface where the tram lines from the two shafts junction, thus enabling lode material to be hauled from either, and as the two shafts get wider apart as depth is attained, a fairly large area of ground is being tested and made available for stoping.

Samples of lode material at 110ft. level were taken from different parts of the workings—

No. 1.—Bottom of drive, lode 18in., gave 1oz. gold and 8dwts. silver.

No. 2.—Bottom E. end lode 12in., 1oz. 10dwts. gold and 10dwts. of silver per ton.

No. 3.—E. of No. 1 shaft, lode 20in., 17dwts. gold and 10dwts. silver per ton.

No. 4.—W. end of drive, lode 18in., 14dwts. gold and 8dwts. silver.

No. 5.—W. face of stope, lode 18in., 11dwts. gold and 10dwts. silver per ton.

No. 6.—Galena seam, 12in., 1oz. 18dwts. gold and 9ozs. silver per ton.

No. 7.—From 20ft. in prospecting shaft 12in. lode, 1oz. 10dwts. gold and 12dwts. silver per ton.

The prospects of this property are good, as the ore body proved is extensive and likely to continue in depth.

The battery and cyanide plants at the Virginia are in splendid working order, and recently a new saw bench and concentrating table have been added. These are being worked by the battery engine. The concentrates saved carry 30 per cent. lead and 1½ozs. gold per ton. (23-2-16.)

THE HOMEWARD BOUND GOLD MINE (*vide* Record, page 246, and Reviews Nos. 9, 11, 14, 15, 18, 19, 20, 21, and 22).—Situated near Mannahill.

Mining is carried on by two separate parties. *Morgan and party* are working near the eastern boundary, and have recently sunk a shaft a short distance from the outcrop, 10ft. vertical to the main ore channel, and from that point it was carried down in the lode to a depth of 55ft. A fair amount of stoping has been done E. and W. from this shaft. One parcel of ore from the lower portion gave a return of 1oz. of gold per ton, and a second parcel of 8 tons from the higher levels gave 11dwts. per ton. Driving W. from the bottom of the vertical shaft is now in progress. The lode in this drive consists mainly of ferruginous quartz with pyrites, carrying a little gold for a width of 12in. Three samples were taken from different points in this drive. No. 1 gave 1dwt. of gold per ton; No. 2, 3dwts.; and No. 3, 2dwts. of gold and 20ozs. 18dwts. of silver per ton. The latter sample contained a fair amount of galena, which accounts for the large amount of silver.

Jones' Workings are situated close to the eastern boundary of the Klondyke. Here an underlie shaft has been sunk in the ore channel to a depth of 45ft. At the 35ft. level a drive has been extended E. in the lode a total distance of 50ft. The lode material disclosed consists chiefly of ferruginous calcite 12in. to 14in. wide, containing rich patches of gold associated with bismuth. A parcel of 5 tons treated at the Petersburg Cyanide Works gave a return of 2ozs. 8grs. of gold per ton, the gold being valued at £4 2s. per ounce.

Stoping is now in progress back of 35ft. level. The lode material is defined and appears likely to extend for a great distance along the line of strike. Sample taken from face of the stope gave 1oz. 6dwts. of gold per ton. Sample of the ore dump at surface gave 2ozs. 9dwts. gold and 12dwts. silver per ton.

Two samples from small veins in the faulted country at the 202ft. level in the main underlie shaft gave no values. Above the fault in these workings from the 175ft. level upward there appears to be a large block of ground available for stoping. (24-2-16.)

MARTIN GLYNN'S GOLD CLAIM.—Situated on Oulnina Station, $\frac{1}{2}$ mile N.W. from Benda Dam and 20 miles in a S.E. direction by road from Mannahill.

This is a new mining venture recently started on the S.W. border of the Wadnaminga goldfield. The prospecting done so far on the block consists of one pit 6ft. deep and several shallower holes at different points along the outcrop for a length of 245yds. In these limited workings a fairly defined lode formation is disclosed, strike N. and S., dip 45° E. The lode matter consists mainly of ferruginous quartz, both solid and friable, 5ft. to 6ft. wide, containing iron pyrites and carrying a fair quantity of free gold, mostly of a fine nature, and, as shown by the samples taken, the gold appears to be well distributed through the matrix with fairly rich patches in places.

No. 1 sample, taken across the S. end of 6ft. hole for a width of 3ft., gave by assay 16dwts. of gold and 14dwts. of silver per ton.

No. 2 sample, taken across the N. end at the same level for a width of 3ft., gave 15dwts. gold and 6dwts. of silver per ton.

No. 3 sample, taken from what appeared to be the footwall, gave 5dwts. gold and 8dwts. silver per ton.

No. 4 sample, taken of different bits of the honeycombed quartz, which occurs in small pockets in the formation and appears to be the richest portion of the ore channel, gave 5ozs. gold and 16dwts. silver per ton.

At a point 160yds. N. from the main hole work has been done in the outcrop to a depth of 3ft., disclosing the same nature of lode matrix. Sample taken from bottom of this hole for a width of 2ft. 6in. gave 4dwts. of gold and trace of silver. About 60yds. farther N. the outcrop of the lode is exposed on surface. A sample taken at that point gave a trace of gold and silver nil.

At the N. end of the block 245yds. N. from the first hole some work has been done in the outcrop, exposing 3ft. to 4ft. of similar lode matrix, but the quartz here is slightly stained with copper carbonates, and in one piece of quartz a little gold was visible. Sample taken from different parts of this hole gave 14dwts. gold and 14dwts. silver per ton.

As shown at present along the line of strike and in the limited work done on the property, the reef as disclosed appears of very promising nature, both as regards width and value, but probably, as indicated by the results from samples taken, the best gold-bearing stone will occur in shoots. Considering the encouraging prospects so far revealed the reef fully warrants further testing at greater depth by sinking on the ore channel. This would show if the values now disclosed in the present openings are likely to prove permanent, and it would also determine the actual width of the ore body available at greater depth. (23-6-16.)

LOCALITY—EYRE'S PENINSULA.

THE IRON MOUNT MINE.—Hundred Hutchison, about 5 miles N.W. from Tumby Bay.

A ridge running N.E. and rising in places to 250ft. above the plain traverses the blocks. A large ironstone formation outcrops on top and can be traced across the property. At several points open workings in the cap of the formation were made some years ago, and a considerable quantity of ironstone was sent away for fluxing purposes. Iron ore of fairly good quality is exposed for over a chain wide, but the full width cannot yet be determined with any degree of accuracy until further work has been done.

At one point on the blocks, where the ridge is divided by a deep water-course, large quantities of ironstone partly buried in the surface soil are seen over a considerable area; this and other indications in the vicinity show that the iron deposit is fairly extensive.

A few feet above the creek bed a tunnel has been driven into the hill by a previous company a total distance of 140ft. The strata exposed consist of alternate layers of clay slate, kaolin, and ironstone seams varying in thickness from 6in. to 15in. with large bunches of ironstone in places. For about the last 30ft. the ironstone is more compact, with less intrusive veins of rock material.

At a point about 20ft. E. from the tunnel a vertical shaft, sunk some years ago, is down a total depth of 80ft., the material passed through in sinking consists mainly of kaolin, clay slate, and small veins of ironstone.

Seven samples of ironstone gave on assay the following results:—

- No. 1.—From 130ft. to 140ft. E. side of tunnel, 41.6 per cent. iron.
- No. 2.—“ 120ft. to 130ft. E. side of tunnel, 34.8 per cent. iron and 0.3 per cent. manganese.
- No. 3.—“ 110ft. to 120ft. E. side of tunnel, 38.7 per cent. iron and 0.5 per cent. manganese.
- No. 4.—“ bottom of vertical (stacked on surface), 42.1 per cent. iron.
- No. 5.—“ different parts of outcrop on top of hill, 48.0 per cent. iron.
- No. 6.—“ workings on top of hill, 50.5 per cent. iron.
- No. 7.—“ side of hill, 44.4 per cent. iron.

The Tumby Bay and Port Lincoln copper lodes are about 20 chains to the E. and possibly traverse the Iron Mount; the cheapest way to test this, and also the extent of the ironstone, would be by a few bores. (13–3–16.)

THE TUMBY BAY COPPER MINE (*vide* Record, page 136, and Reviews Nos. 11, 14, 16, 17, 18, and 20).—Sited 5 miles N.W. from Tumby Bay.

No work was in progress, but the workings were examined to water level, a depth of 111ft. from surface.

Prisk's shaft, sunk on the underlie of the lode, is down a total depth of 167ft.; it has been equipped with 8h.p. oil engine and gear for hauling, also a belt gear is attached to the engine to drive a small pump placed in the shaft with 2½in. water pipes.

At the 95ft. level a drive in the lode has been extended W. a total distance of 150ft., or about 50ft. past Stephen's shaft; this drive was a means of access to the latter, and being a main air channel to ventilate the workings should have been preserved for that purpose by proper timbering prior to commencing stoping, but so far as could be seen no attempt appears to have been made to keep the drive open for future use. The ore over the whole length of the drive and for 50ft. up has been stoped out, and the mullock displaced in the operation has filled everything up from the bottom of the drive to the 45ft. level. This mode of working at the present stage of the mine is most unwarrantable, as it will deter future operations.

At this level a drive in the ore channel has been carried in E. for a distance of 12ft., the lode material exposed consists of ferruginous quartz and decomposed rock 12in. to 18in. wide, containing copper ore, chiefly malachite. Sample taken for full width of vein in face of drive gave 14.1 per cent. copper. The ore channel here is well defined, and the extension of the drive eastward at this level is most important, as it would explore a large portion of the holding hitherto not tested, and as the work done would be near water level a fair idea could be formed as to how the lode is likely to prove in the sulphide zone. Sample taken of the lode 12in. wide at water level in the shaft, 111ft. from surface, gave 8.4 per cent. copper.

At the 45ft. level a drive has been carried in E. 9ft., the formation is 18in. wide, with a 6in. seam on the footwall containing copper carbonates. A sample taken of the vein gave 5.4 per cent. copper. A sample taken from the end of the shaft opposite the drive for a width of 2ft. gave 1.4 per cent. copper.

About 20 chains N. from the Tumby Bay workings, and nearly half-way between the Flinders and Tumby run of lodes, a vertical shaft sunk by the Tumby Bay Company is down a total depth of 167ft.; the material passed through in sinking consists mainly of fine-grained, hard, igneous rock. As this shaft is situated a long way off the trend of the two well-known ore channels in this locality the prospects of discovering anything at this point on the property are far from promising. (14-3-16.)

MAGNESITE MINE.—On section 42, hundred Yaranyacka, about 7 miles from Tumby Bay.

Magnesite shows above the soil here for a length of 4 chains N. and S., by 2 chains wide, and in this area a trench has been made for a length of 100ft. N. and S., by 5ft. wide in places down 12ft., and bunches of high-grade magnesite from a few hundredweights to several tons in weight have been extracted.

No. 2 open cut is 12ft. wide, carried down on a slight angle, the greatest depth being 16ft. Fairly strong bodies of magnesite show here, and appear likely to go down much deeper.

It seems very probable that large quantities of magnesite are available on this block. One hundred tons recently extracted are now at Tumby Bay jetty bagged ready for shipment to the Associated Smelting Co., Port Pirie.

A sample yielded on analysis by the departmental analyst—

	Per cent.
Silica	1.90
Alumina62
Ferric oxide11
Calcium carbonate23
Magnesium carbonate	97.25
	<hr/>
	100.11

(15-3-16.)

THE TUMBY BAY SYNDICATE'S MAGNESITE MINE.—On section 27, Hutchison, about 7 miles from Tumby Bay.

Magnesite in nodules and boulders shows on the surface, outcropping through the soil for a length of several chains N. and S., and in places nearly a chain wide. Prospecting pits sunk at different points to depths of from 8ft. to 10ft., expose boulders of white and some of rather dark colored magnesite. On the N. side of a small watercourse traversing the block an open cut 6ft. by 5ft. has been made, showing a body of magnesite, friable, partly concreted, and easily detached.

A short distance N.E. from the creek two open cuts 30ft. apart have been carried on an incline into the rising ground for a distance of 25ft. and 30ft. respectively. Both of these show seams and boulders of magnesite associated with graphite, and the deposit appears likely to extend northward. Thirty tons of magnesite have been



Scraping Salt, Hundred of Dalrymple, Yorke Peninsula,

Face page 62.

dispatched to market from this property, and several tons are now stacked on the surface. Sample from the open workings yielded on analysis at the School of Mines :—

	Per cent.
Silica	2.50
Alumina97
Ferric oxide80
Calcium carbonate	4.46
Magnesium carbonate	89.91

Sample taken from workings near creek—

	Per cent.
Silica	1.30
Alumina72
Ferric oxide31
Calcium carbonate34
Magnesium carbonate	97.55

(15-3-16.)

THE TUMBY BAY SYNDICATE'S TALC MINE.—Situated on section As, Yaran-yacka, about $2\frac{1}{2}$ miles W. from Lipson.

On the brow of the ridge a vertical shaft has recently been sunk to a depth of 22ft. The material disclosed consists mainly of talc, with nodules of quartz. For the first 10ft. the material is slightly discolored by iron oxide, the lower portion for 12ft. is white and compact, and appears of fairly high quality. Judging from indications this lower deposit appears likely to prove extensive, and if driven on at present level should yield a large quantity of marketable material. Four tons of the talc obtained in sinking have recently been sent to market.

Sinking is still in progress, and the bottom of the shaft is now in a change of country consisting of soft ferruginous clay-slate, possibly only an intrusive belt, and more talc may be discovered below it. (15-3-16.)

